This document is “OKI DATA – CONFIDENTIAL”

Only persons and parties authorised by OKI DATA have permissions to access this document.

This document should not be accessed by any parties without the approval of OKI DATA.

Anyone who is found to be contradicting the above may be subject to legal action.

OEL
Maintenance Manual

ML5100FBeco

Revision 2

Rev	Date	Oki Data Corporation
1	2012-09-25	
2	2013-12-18	
		ML5100FBeco Maintenance Manual

Document Revision History

Rev.No.	Date	Corrected items			Person in charge
		No.	Page	Description of change	
1	2012-09-25			Issue	PHE13 K. Noguchi
2	2013-12-18		22, 43, 45, 48, 52	Addition of a precaution and menu items	P3E22 Y. Sato

PREFACE

This manual is for people involved in maintenance and describes on-site maintenance methods for ML5100FB.
Among the configured parts, those that must be specified for ordering such as print circuit board are applied with a number.

E.g. ABCD-3 Print circuit board

The number is applied to specify the type of configuration part and is not the version number.
Parts are not described in numbers other than those listed in the configuration parts table unless otherwise required.
Regarding the methods for handling and operating the device, please refer to the Users Manual.

CAUTION:

- Copying this document or a portion of this document without permission is prohibited.
- The contents of this document is liable to change with no advance notice.

CONTENTS

1. CONFIGRATION 6

1.1 Standard Configuration 6

2. CLEANING 7

2.1 Cleaning the Sensors 8

2.1.1 Cleaning the table sensor and paper-end sensor 8

2.1.2 Cleaning the gap sensor and carriage sensor 8

3. LUBRICATING 9

4. MAINTENANCE TOOLS 17

5. REPLACING PARTS 18

5.1 Precautions Upon Replacing Parts 18

5.2 Removing and Reinstalling Parts 19

5.2.1 Print head 19

5.2.2 Ribbon protector bracket and Ribbon protector 20

5.2.3 Upper cover assembly 21

5.2.4 Control board 22

5.2.5 Head cables 23

5.2.6 Ribbon feed assembly 24

5.2.7 Space motor 25

5.2.8 Frame guide 26

5.2.9 Slider Pice-Slider 27

5.2.10 Mini pitch belt 28

5.2.11 Pin Tractor Assembly 29

5.2.12 Printer unit 30

5.2.13 LF motor 31

5.2.14 Table sensor, micro switch, photo sensor, sensor cord 32

5.2.15 Power supply unit 33

6. ADJUSTING 34

6.1 Adjusting the Gap Between the Platen and Print Head 34

6.2 First line position compensation 36

6.3 The amount compensation of 40 lines 38

6.4 Compensation of a printing gap of both directions 40

6.5 Paper cut position compensation 41

7. MAINTENANCE TEST 43

7.1 Selecting the Test Mode 43

7.2 Setting the Menu 45

7.2.1 Items in the menu 45

7.2.2 Setting the menu 57

8. PROCEDURES FOR REPAIRING 59

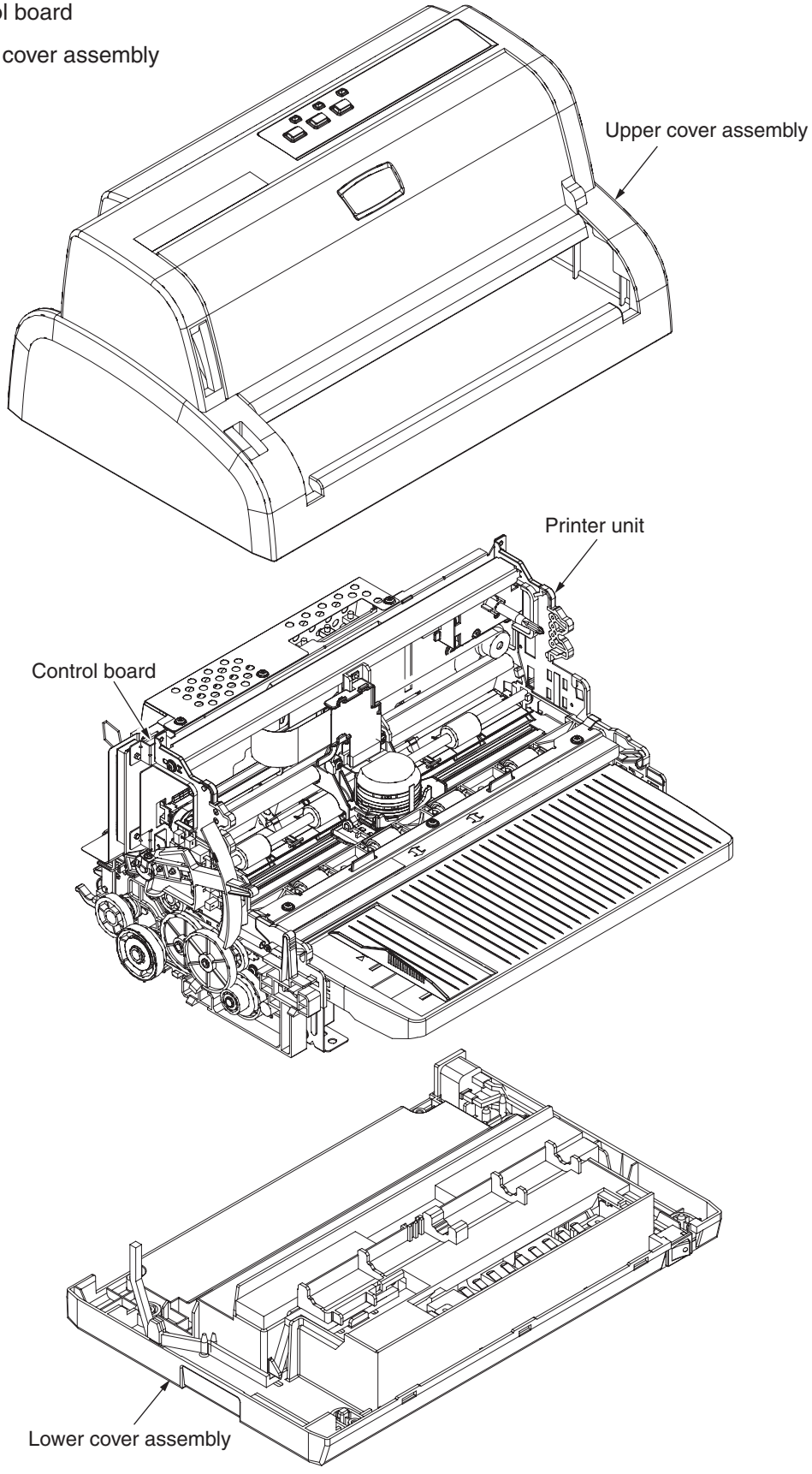
9. PERIODICALLY REPLACED PARTS 66

10 OPERATION 67
10.1 Summary 67
10.2 Circuit Operation (See Fig. 10-1) 68
10.2.1 SoC and peripheral circuits 68
10.2.2 Initializing operation 71
10.2.3 Controlling the interface 72
10.2.4 Print head control drive circuit 75
10.2.5 Spacing 75
10.2.6 Line feed 75
10.2.7 Alarm circuit 75
10.2.8 Paper-end detect circuit 75
10.2.9 Power source unit 75
10.3 Mechanism and Operation 76
10.3.1 Mechanism and operation of the print heat 76
10.3.2 Mechanism and operation of space 77
10.3.3 Mechanism for adjusting the head gap 78
10.3.4 Mechanism and operation of ribbon feed 79
10.3.5 Mechanism and operation of paper feed 80
10.3.6 Mechanism for detecting the paper-end 81
10.3.7 Mechanism for detecting the table sensor 82
APPENDIX A PCB LAYOUT 83

1. CONFIGRATION

1.1 Standard Configuration

(1) Upper cover assembly
(2) Printer unit
(3) Control board
(4) Lower cover assembly



2. CLEANING

CAUTION:

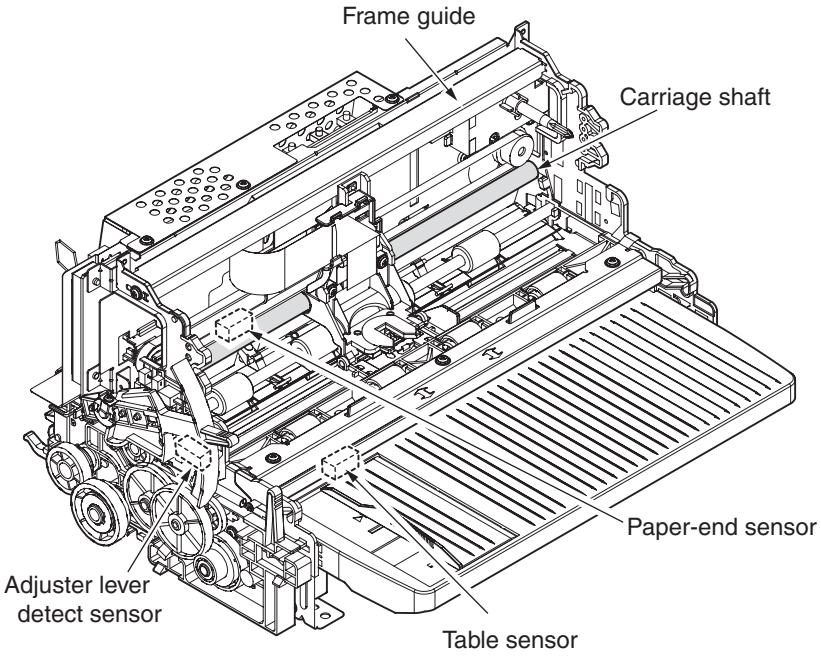
- Turn OFF the power source switch when cleaning.
- Be careful that chipped paper or dust does not go into the mechanism.
- After cleaning lubricated portions, be sure to lubricate again.

Clean the inner sections of the printer at a scheduled interval according to the following conditions.

Interval: After operating for six months or 300 hours.
Required Time: Approx. 10 minutes
Tools: Dry cloth (soft cloth such as a gauze), brush, cotton swabs, vacuum cleaner
Sections to Clean: See Table 2-1.

Table 2-1 Section to Clean

Section to Clean	Contents
Carriage shaft and its periphery	Eliminate chipped paper and wipe away dust, ribbon chips, etc.
Both sides of the frame guide upper section	
Paper path surface	
Paper-end sensor Table sensor Adjuster lever detect sensor Carriage homing sensor	Wipe off dust attached to the sensor using a brush or cotton swag.



2.1 Cleaning the Sensors

2.1.1 Cleaning the table sensor and paper-end sensor

(1) Remove the upper cover assembly. (See 5.2.3)

(2) Remove the control board. (See 5.2.4)

(3) Wipe the sensor with a cotton swab.

2.1.2 Cleaning the gap sensor and carriage sensor

(1) Remove the upper cover assembly. (See 5.2.3)

(2) Wipe the sensor with a cotton swab.

3. LUBRICATING

Lubricate the required section according to the following items.

(1) Timing
This printer is a maintenance-free device, therefore, it does not require lubrication while in operation. However, it must be lubricated after disassembling/reassembling, cleaning lubricated sections, or replacing parts.

(2) Lubricant
- Albania Grease #2EP (Showa Shell Oil or an equivalent product) ..... GEP

(3) Amount of lubricant
- Sufficient .....Ⓐ ..... Apply the amount of lubricant needed.
- Normal .....Ⓑ ..... Apply three or four drops of oil or approximately 0.2 mm thick grease.
- Small .....Ⓒ ..... 0.006 ± 0.002 g

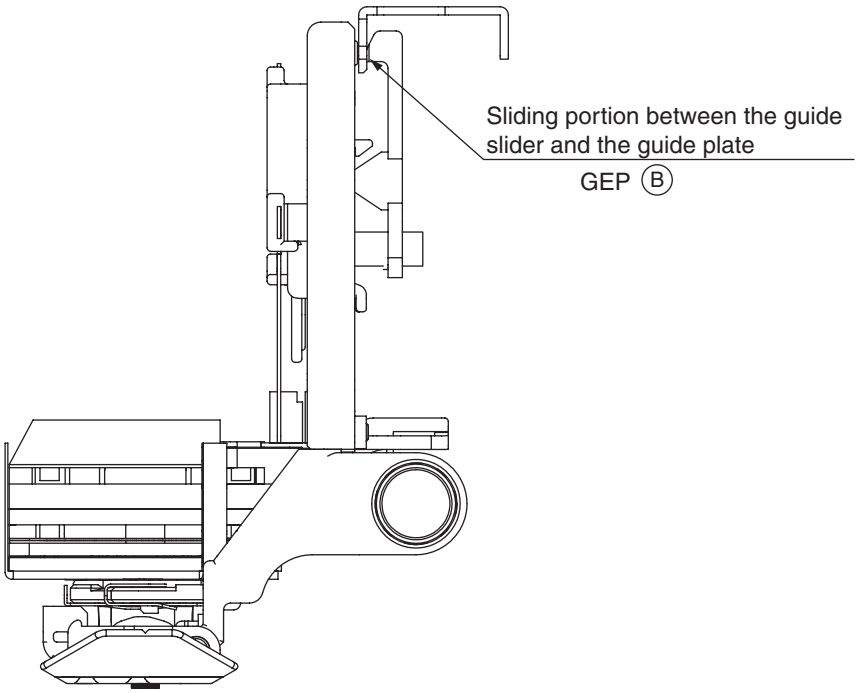
(4) Parts that must not be lubricated

Table 3-1 Parts that must not be lubricated

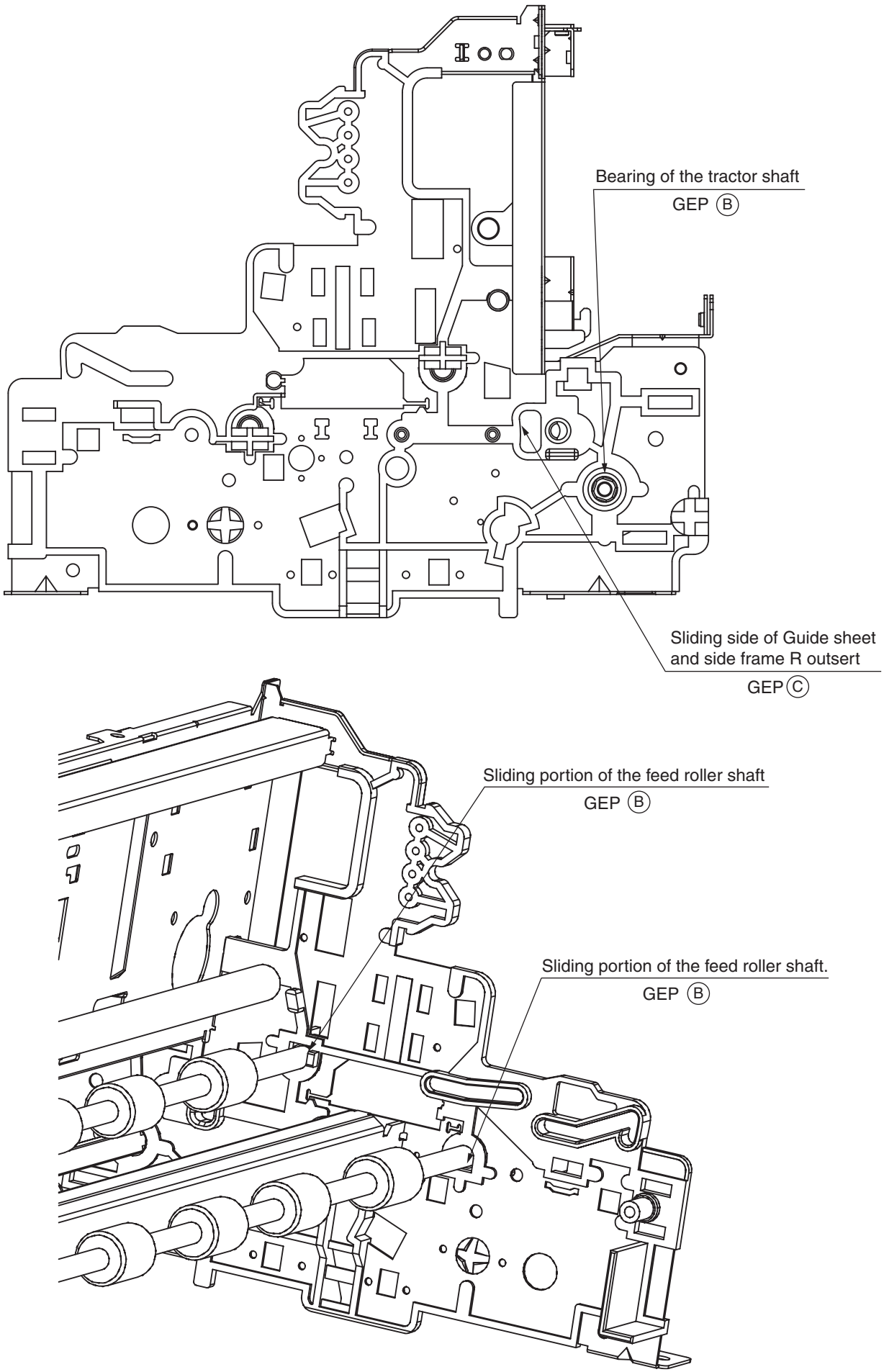
No.	Prohibited Parts	Reason	Remarks
1	Ink ribbon	To prevent smeared print	
2	Sensors	To prevent dust from attaching	
3	Platen (resin surface)	To prevent smeared paper	
4	Feed roller (resin surface)	To prevent smeared paper	
5	Pin tractor	To prevent rubber from deteriorating	
6	Carriage shaft	To secure carriage run load	
7	Head cable	To prevent faulty contact and cracking	
8	Print head	To prevent faulty operation of print head	
9	Mini pitch belt B	To avoid rubber deterioration	
10	Carriage board	To avoid contact failure	
11	Terminal (e.g., connector)	To avoid contact failure	
12	Microswitch	To avoid contact failure	

(5) Parts to lubricate
Lubricate the parts indicated in the following figure.

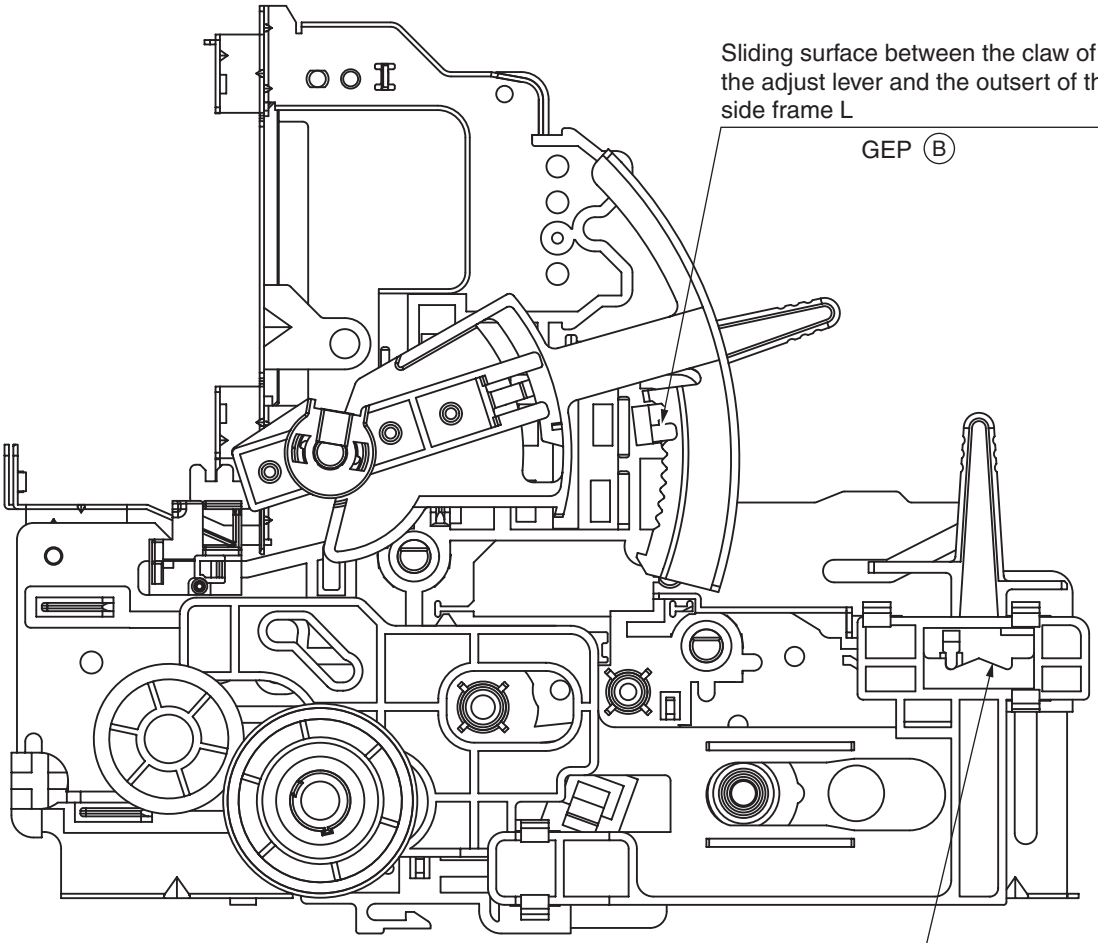
a) Slide guide section of the carriage

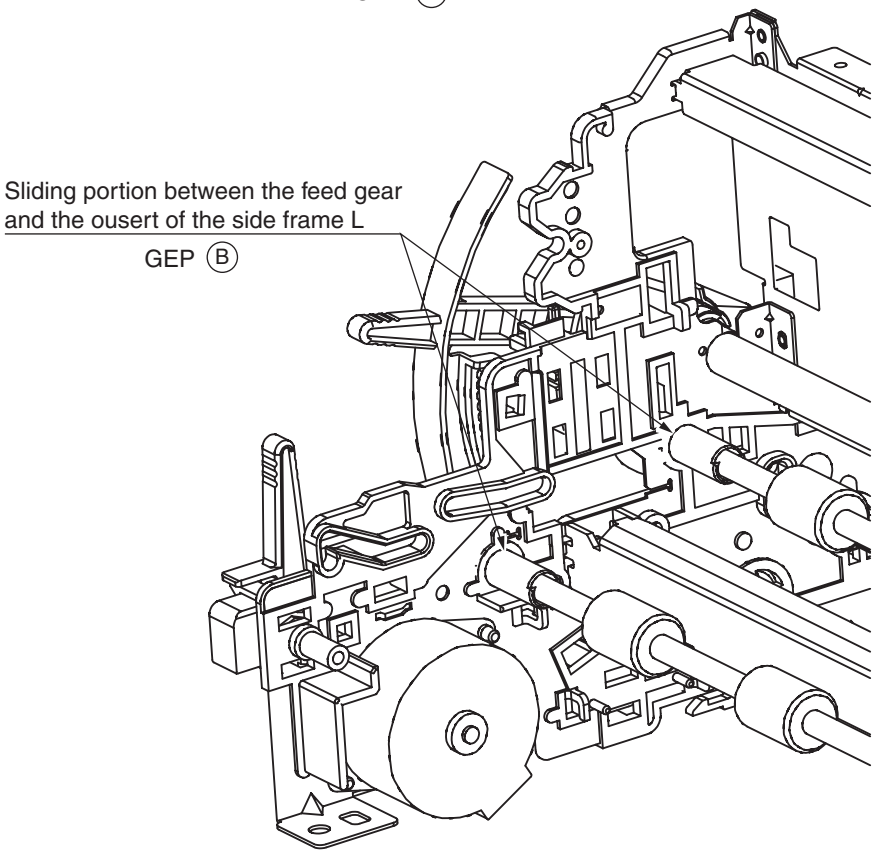


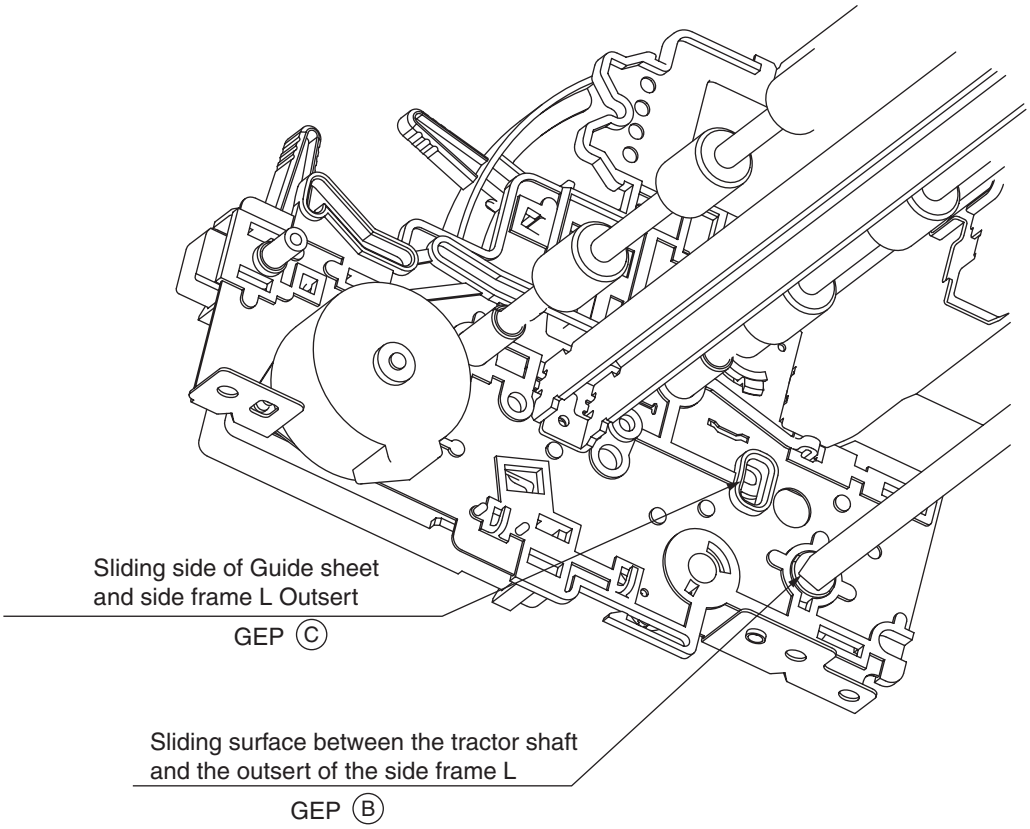
b) Printer section - right side


Bearing of the tractor shaft
GEP (B)
Sliding side of Guide sheet
and side frame R outsert
GEP (C)
Sliding portion of the feed roller shaft
GEP (B)
Sliding portion of the feed roller shaft.
GEP (B)

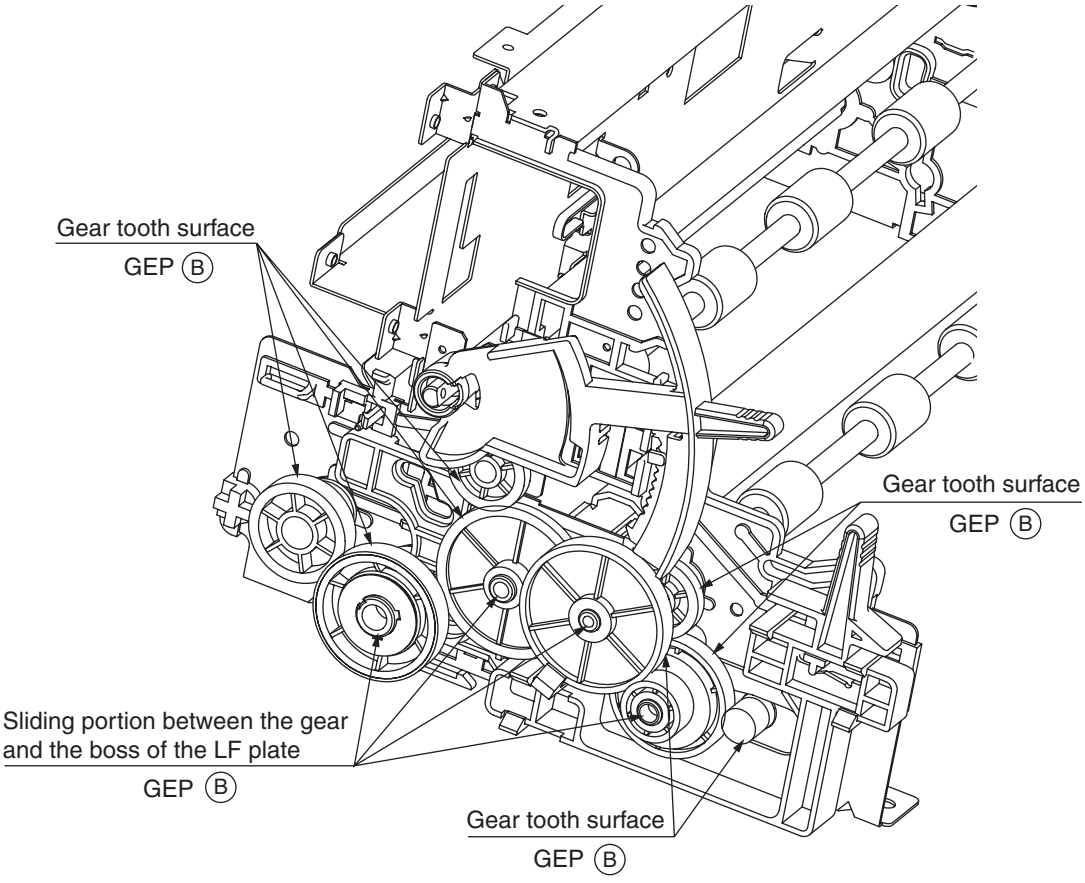
c) Printer section - left side


Sliding surface between the claw of the adjust lever and the outsert of the side frame L
GEP (B)
Sliding surface between the change lever and the side frame
GEP (B)

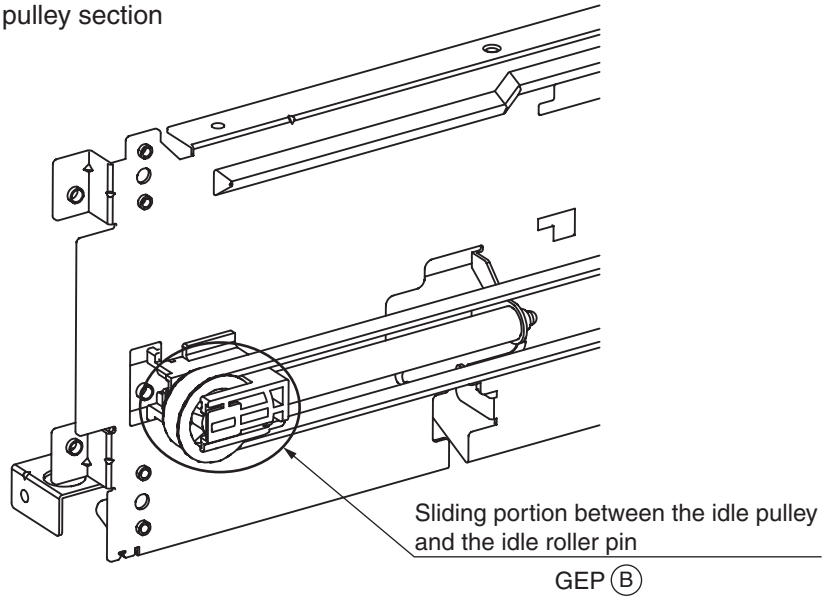



Sliding side of Guide sheet
and side frame L Outsert
GEP Ⓒ
Sliding surface between the tractor shaft
and the outsert of the side frame L
GEP Ⓑ

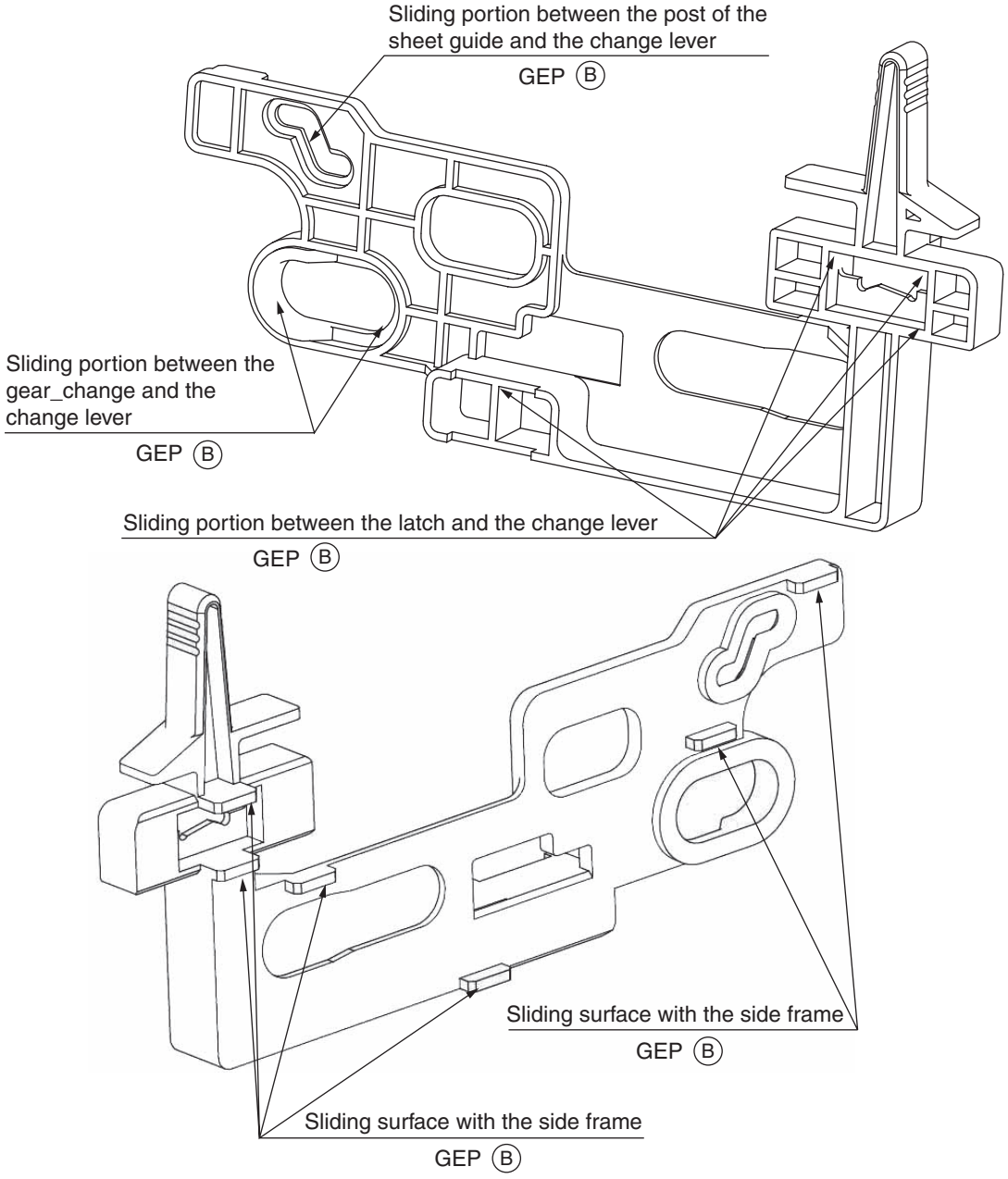
d) LF gear


Gear tooth surface
GEP Ⓑ
Gear tooth surface
GEP Ⓑ
Sliding portion between the gear
and the boss of the LF plate
GEP Ⓑ
Gear tooth surface
GEP Ⓑ

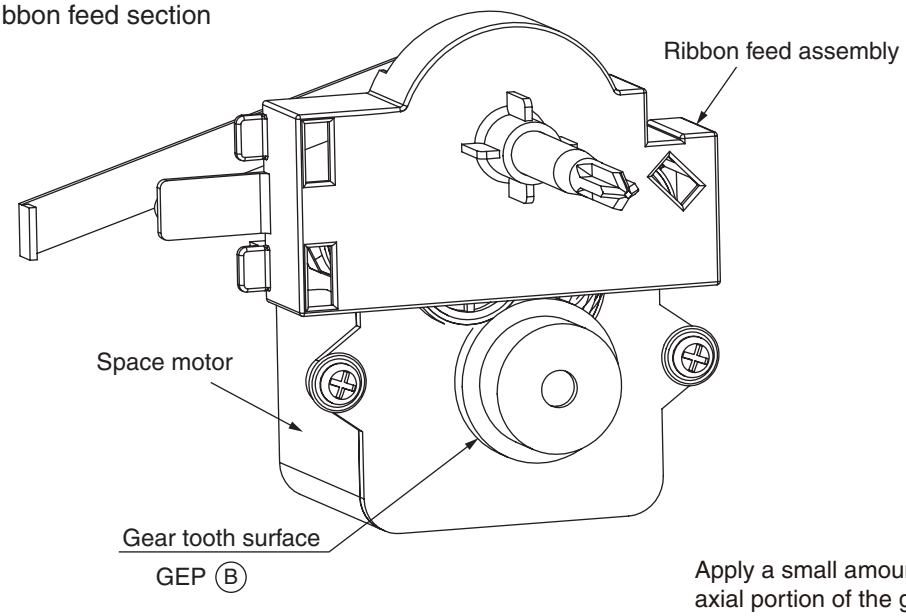
e) Idle pulley section

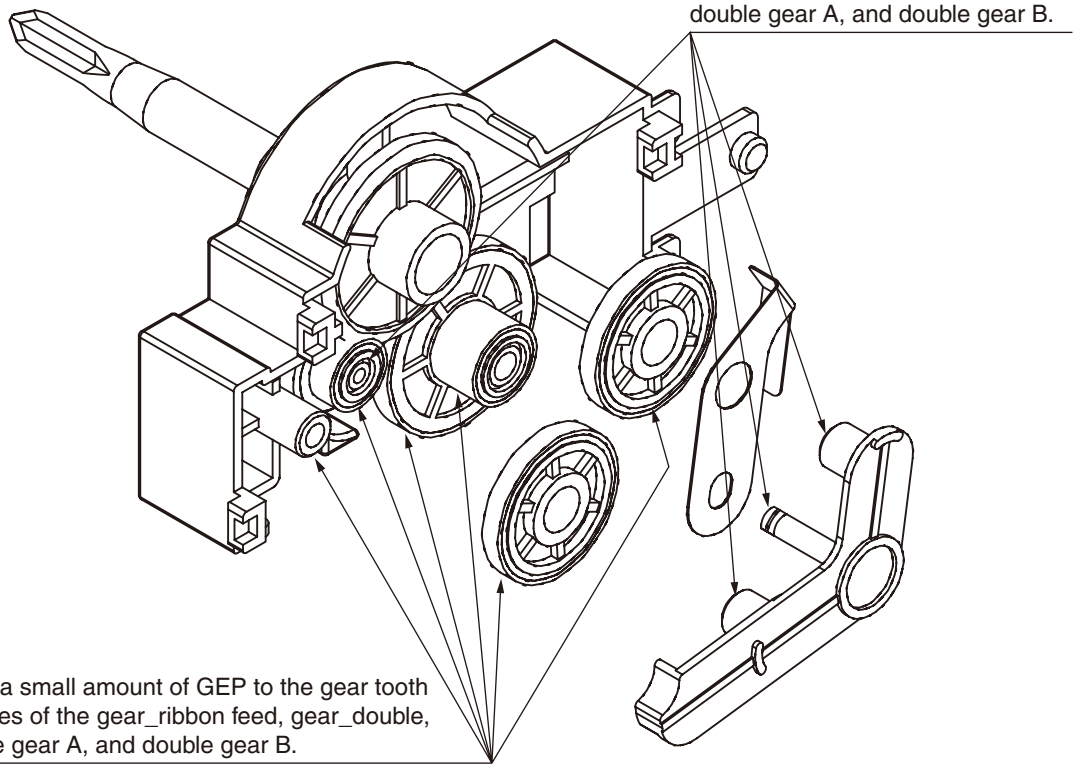


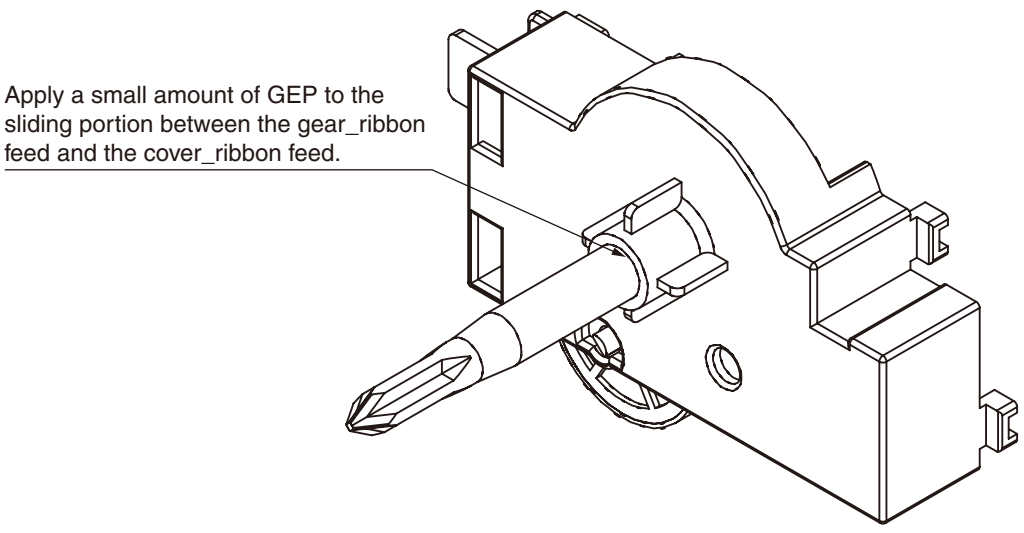
f) Change lever section


Sliding portion between the post of the sheet guide and the change lever
GEP (B)
Sliding portion between the gear_change and the change lever
GEP (B)
Sliding portion between the latch and the change lever
GEP (B)
Sliding surface with the side frame
GEP (B)
Sliding surface with the side frame
GEP (B)

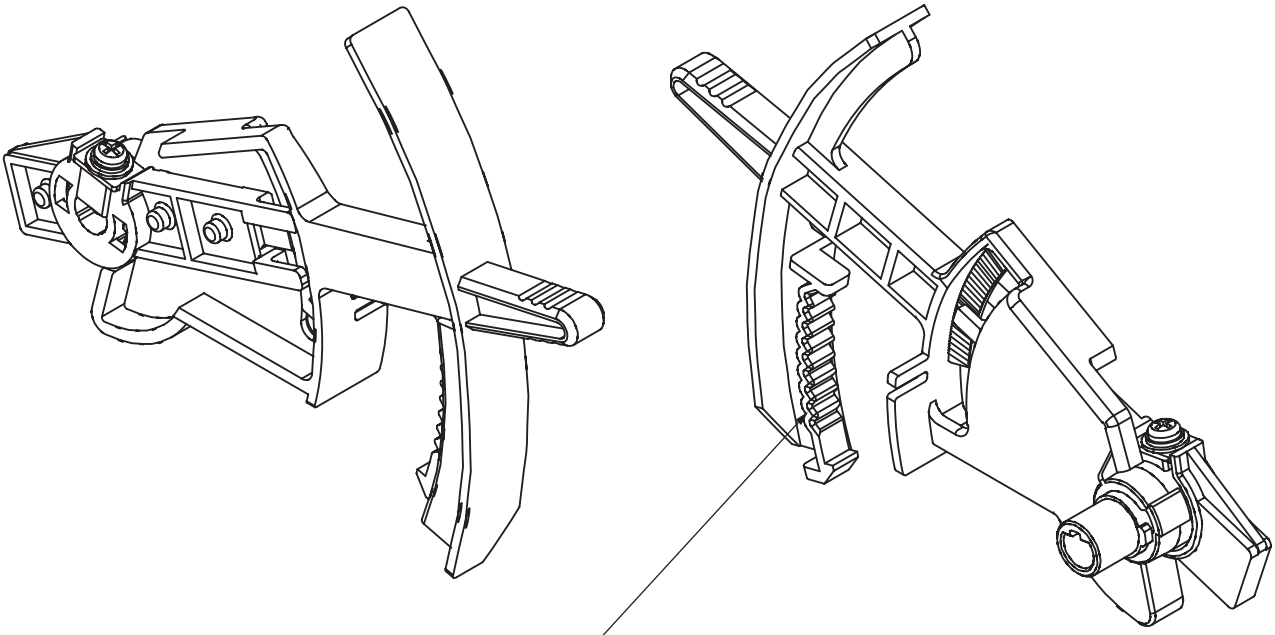
g) Ribbon feed section




Apply a small amount of GEP to the axial portion of the gear_double, double gear A, and double gear B.
Apply a small amount of GEP to the gear tooth surfaces of the gear_ribbon feed, gear_double, double gear A, and double gear B.



h) Adjust lever section



Sliding side nail of Side Frame L Outsert

GEP (B)

4. MAINTENANCE TOOLS

Tools required for replacing parts of the print board and unit on-site are listed in Table 4-1.

Table 4-1 Maintenance Tools

No.	Maintenance Tools	Quantity	Application	Remarks
1	No.1-100 Phillips screwdriver	1	2~2.6 mm screws	
2	No.2-200 Phillips screwdriver	1	3~5 mm screws	
3	5-200 screwdriver	1	3~5 mm screws	
4	Thickness gauge	1	0.43~0.49 thickness	J-42639901YA-3
5	No.3 pliers	1		
6	No.5 nippers	1		

5. REPLACING PARTS

5.1 Precautions Upon Replacing Parts

(1) Turn OFF the printer power switch before disassembling, and first pull the AC plug out from the outlet, then disconnect the AC cord and interface cable from the printer.

⚠Warning	Risk of Electric Shock	

There is a risk of electric shock during replacement of the low voltage power supply.

Use insulating gloves or avoid direct contact with any conducting part of the power supply, and caution should be exercised during replacement.

The capacitor may take one minute to complete discharge after the AC cord is unplugged. Also, there is a possibility that the capacitor doesn't discharge because of a breakage of the PCB, etc., so remember the possibility of electric shock to avoid electric shock.

(2) The print head is extremely hot after a print job, therefore, start the disassembling task five minutes after turning OFF the power.

Furthermore, leave at least 20 seconds after turning OFF the power before disassembling the circuit parts (control board, print head, etc.) in order to prevent electronic parts from being damaged.

(3) Remove paper and ribbon from the printer before disassembling.

(4) After replacing or inspecting parts, be sure to check that connecters are properly connected and that there are no abnormalities.

(5) Do not disassemble the printer when it is operating properly.

(6) Determine the range of disassembling the printer according to the objective and do not disassemble beyond that range.

(7) Use specified maintenance tools.

(8) Disassemble the parts in the specified order. Parts may damage if they are not disassembled in proper order.

(9) Small items such as screws and collars can be lost easily, therefore, set them in their original position temporarily.

(10) IC such as SoC and ROM can easily be damaged by electrostatic, therefore, do not wear gloves that build up electrostatic when handling the print board.

(11) Do not place the print board directly on the floor or printer.

5.2 Removing and Reinstalling Parts

5.2.1 Print head

(1) Open the access cover.

(2) Move the adjust lever to the top.

(3) Pull the upper sheet guide toward the front to lock it.

(4) Disconnect the guide cable ①.

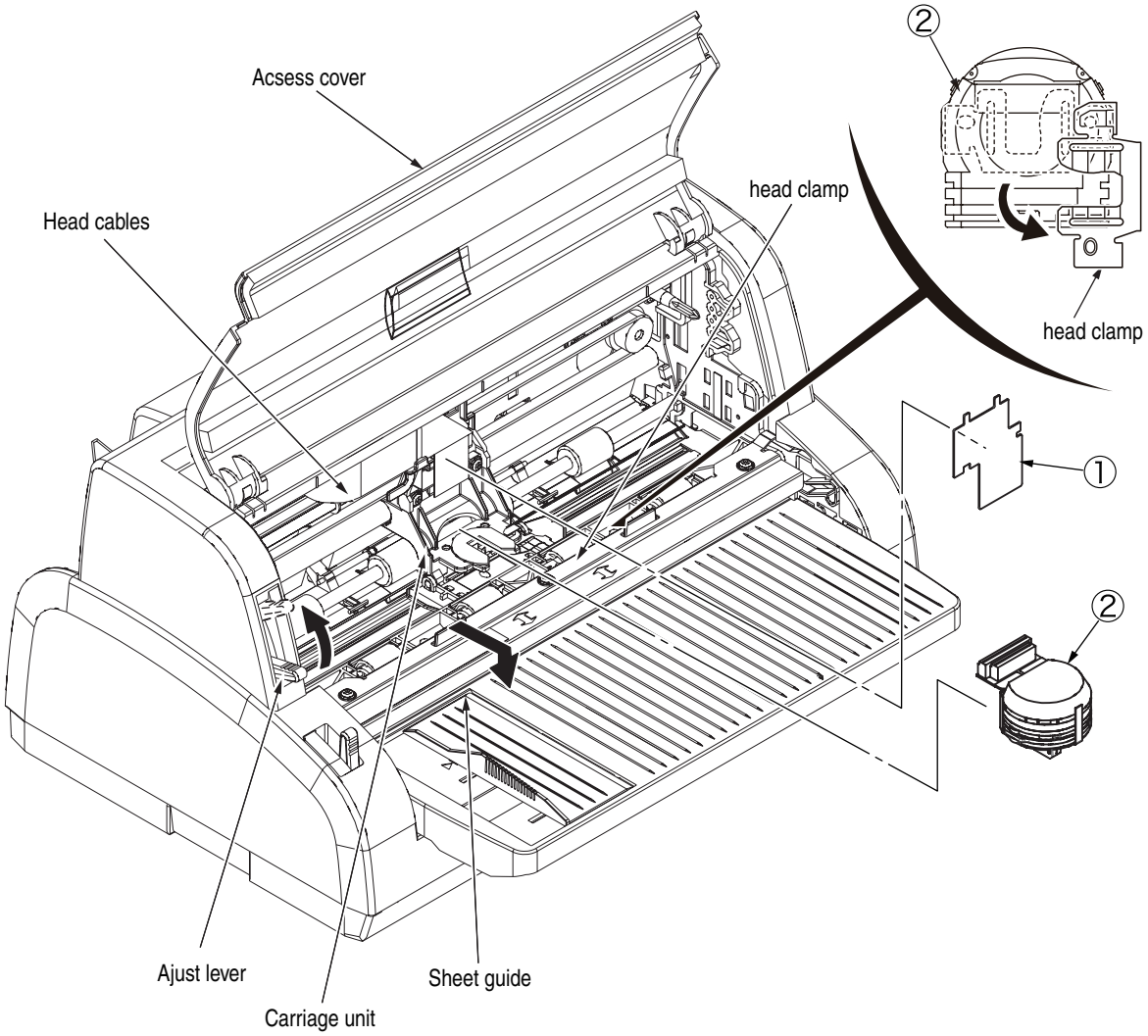
(5) Pull the head clamp toward the front and remove the print head ② by pulling it out toward the front.

(6) Disconnect the two head cables from the print head ②.

(7) Reinstall in the opposite sequence to removal.

(Precautions upon reinstalling)

1. The head clamp must be set securely in the print head ② and carriage unit.



5.2.2 Ribbon protector bracket and Ribbon protector

(1) Remove the print head. (See 5.2.1)

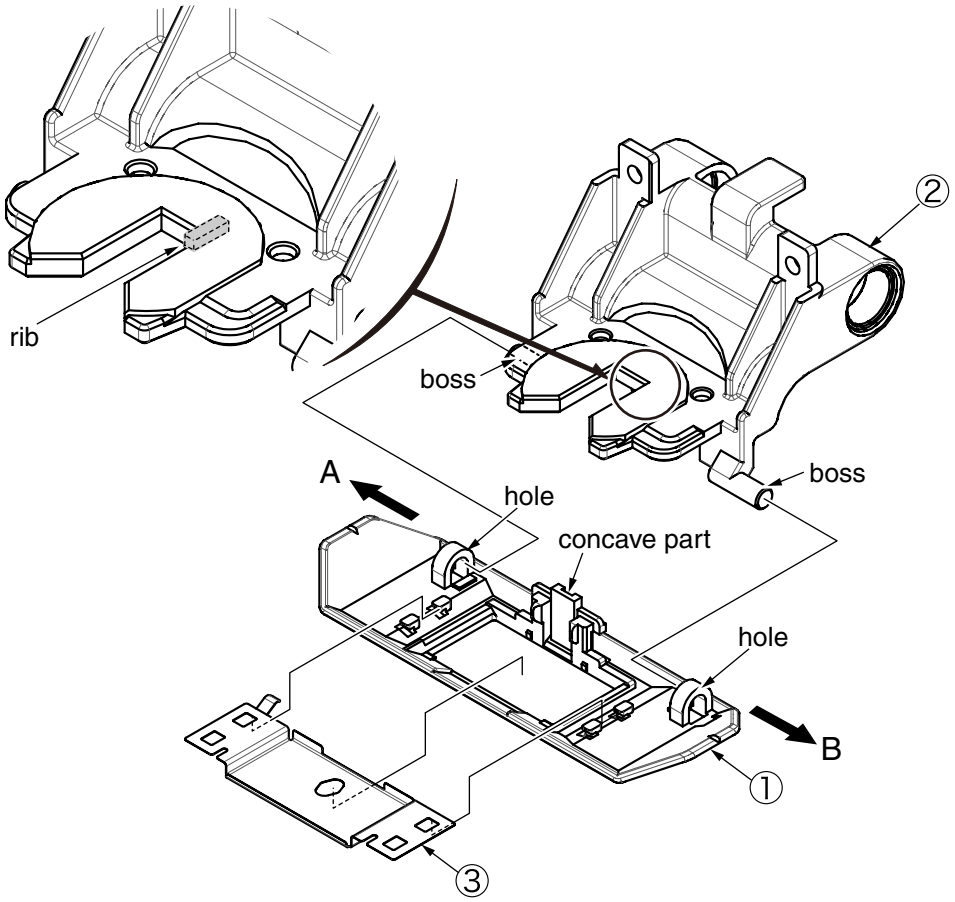
(2) Bend the ribbon protector bracket ① and detach the concave part from the rib of the carriage frame ②.

(3) Slide the ribbon protector bracket ① in the direction of the arrow A and pull the hole of the ribbon protector bracket ① out of the boss .

(4) Slide the ribbon protector bracket ① in the direction of the arrow B and pull the hole of the ribbon protector bracket ① out of the boss .

(5) Remove the ribbon protector ③ from the ribbon protector bracket ①.

(6) Reinstall in the opposite sequence to removal.



5.2.3 Upper cover assembly

(1) Remove the stage assembly ①.

(2) Move the adjust lever ② to the top.

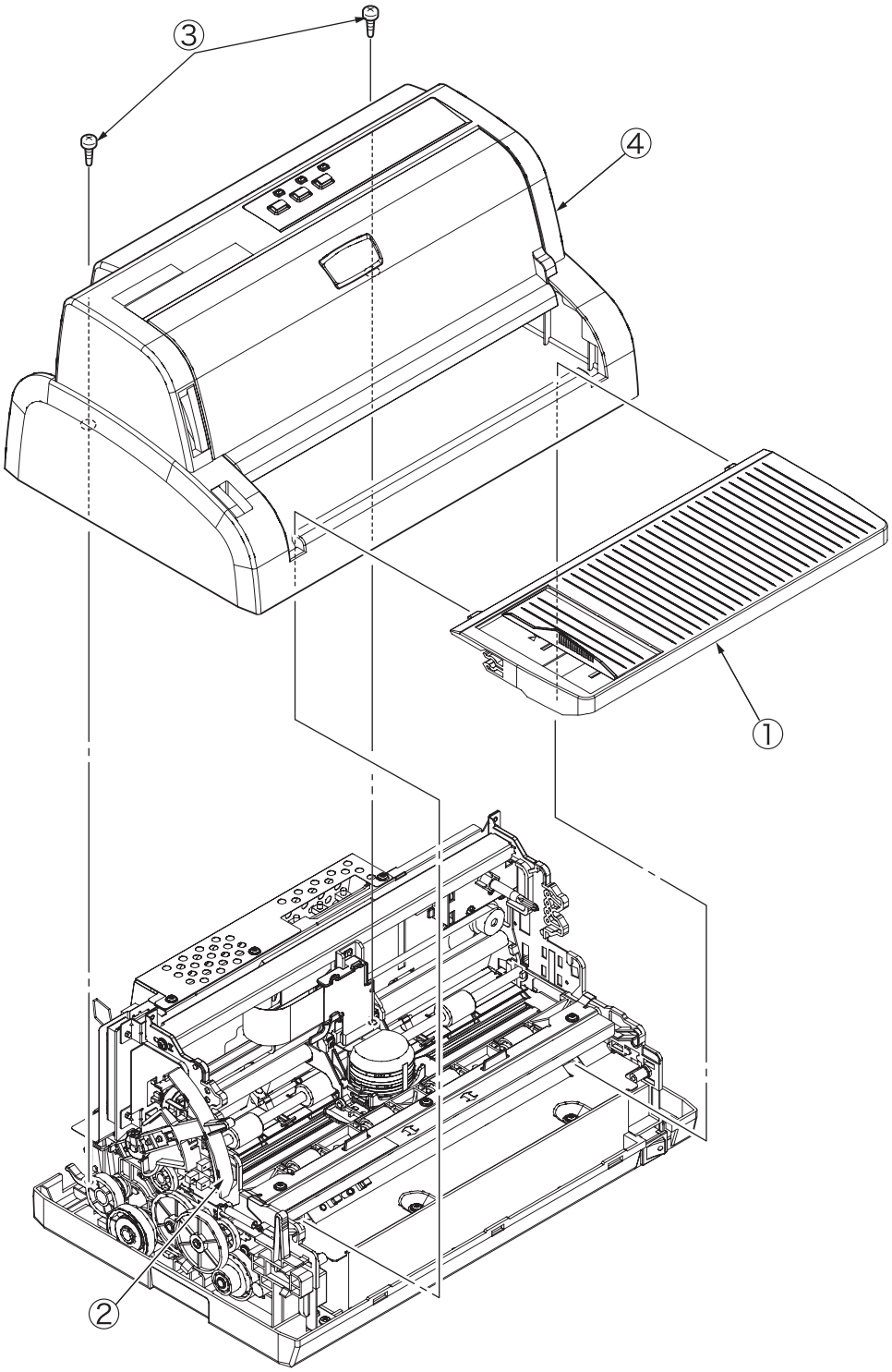
(3) Remove the two screws ③ in the rear.

(4) Detach the three hitch portions from the lower cover in the front section of the upper cover assembly ④.

* The hitched portions can easily be detached by inserting a minus driver from the lower part of the upper cover.

(5) Remove the upper cover assembly ④ by lifting it straight up.

(6) Reinstall in the opposite sequence to removal.



5.2.4 Control board

(1) Remove the upper cover assembly. (See 5.2.3)

(2) Remove the five screws ①, then remove the plate shield (Main PG) ②.

(3) Remove the two hex-head screws ③ and two screws ④, then remove the IF/OP Bracket ⑤.

(4) Disconnect the SP motor, LF motor, Power supply, Printhead 1, Printhead 2, Paper sensor, Home sensor, and continuous/single sensor connectors from the control board ⑥.

(5) Remove the two screws ⑦, then remove the control board ⑥.

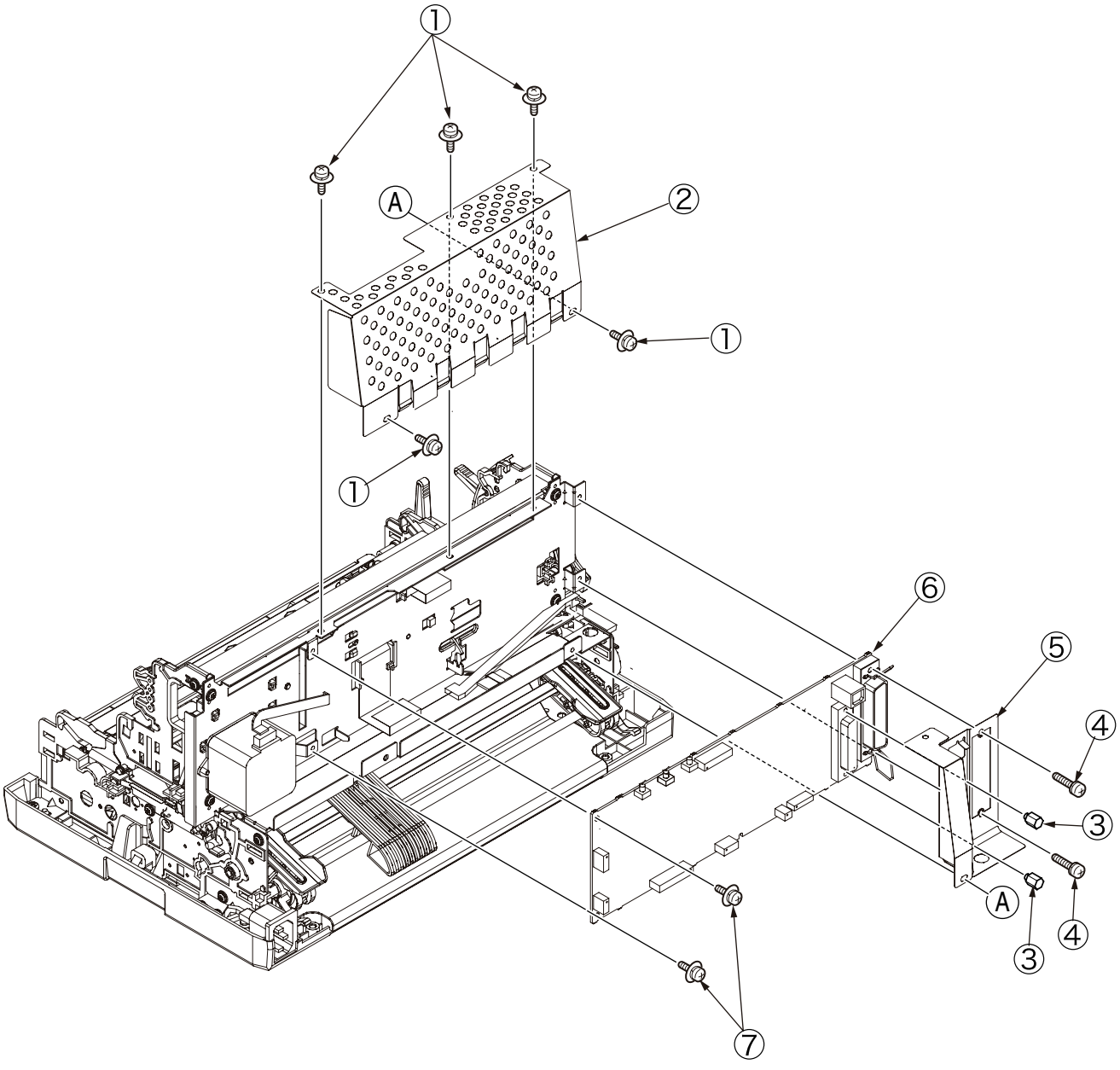
(6) Reinstall in the opposite sequence to removal.

(Precaution upon replacing the control board)

Check the revision number of the device and set either of the following for the "Select bottom Table" menu.

When the revision number is C0 or earlier: "Mode1"

When the revision number is D0 or later: "Mode2" (default)



5.2.5 Head cables

(1) Remove the printhead. (See 5.2.1)

(2) Remove the upper cover assembly. (See 5.2.3)

(3) Remove the control board. (See 5.2.4)

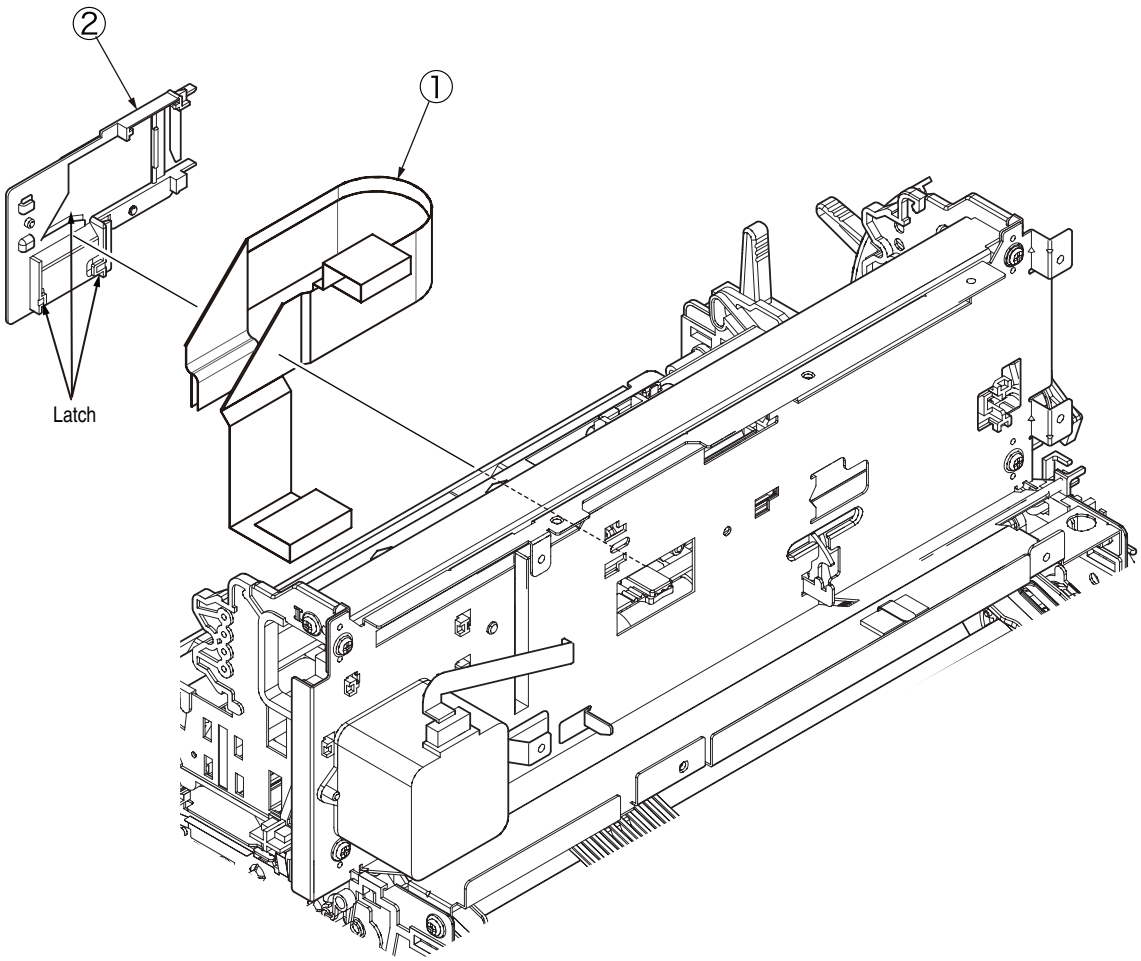
(4) Open the latch and remove the head cables ① together with guide cable ② from the space frame.

(5) Separate the head cables ① from the guide cable ②.

(6) Reinstall in the opposite sequence to removal.

(Precautions upon reinstalling)

1. Be careful to avoid kinking the head cables ①.
2. Do not touch the exposed terminals on the head cables ①. To prevent faulty connections, keep the terminals free of dirt and dust.

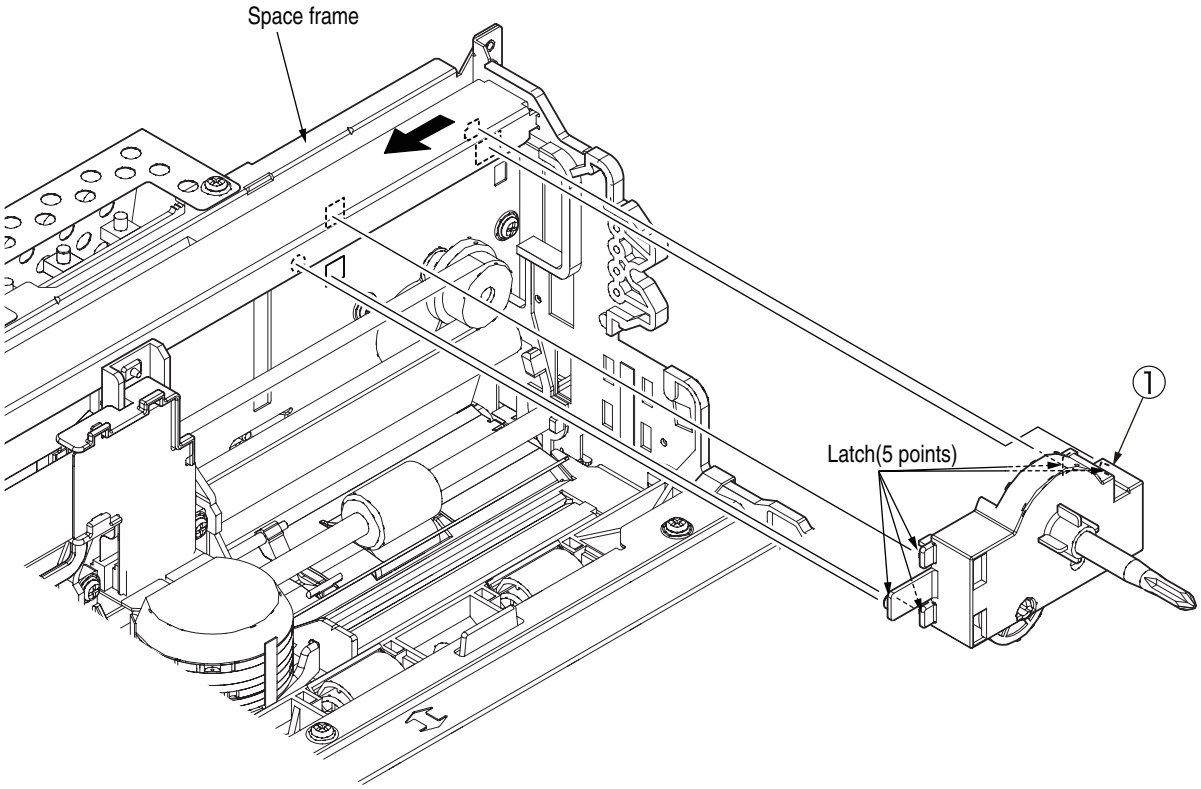


5.2.6 Ribbon feed assembly

(1) Remove the upper cover assembly. (See 5.2.3)

(2) Bend the latch on the space frame forward and slide in the direction indicated by the arrow. This allows the ribbon feed assembly ① to be removed in the forward direction.

(3) Reinstall in the opposite sequence to removal.



5.2.7 Space motor

(1) Remove the upper cover assembly. (See 5.2.3)

(2) Remove the ribbon feed assembly. (See 5.2.6)

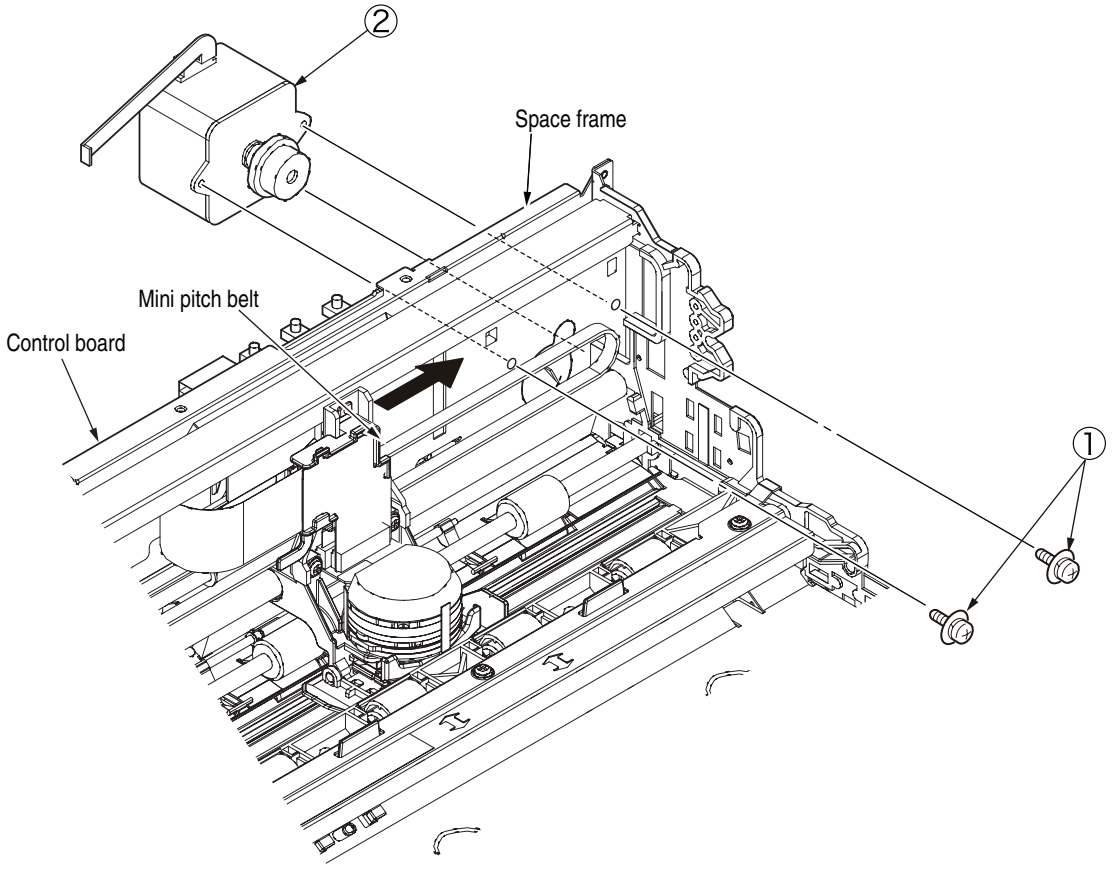
(3) Remove the shield plate B. (See 5.2.4)

(4) Disconnect the space motor connector cable from the control board.

(5) Push the mini pitch belt in the direction indicated by the arrow and remove the pulley belt from the motor pulley.

(6) Remove the two screws ①, then remove the space motor ② from the space frame.

(7) Reinstall in the opposite sequence to removal.



5.2.8 Frame guide

(1) Remove the upper cover assembly. (See 5.2.3)

(2) Remove the control board. (See 5.2.4)

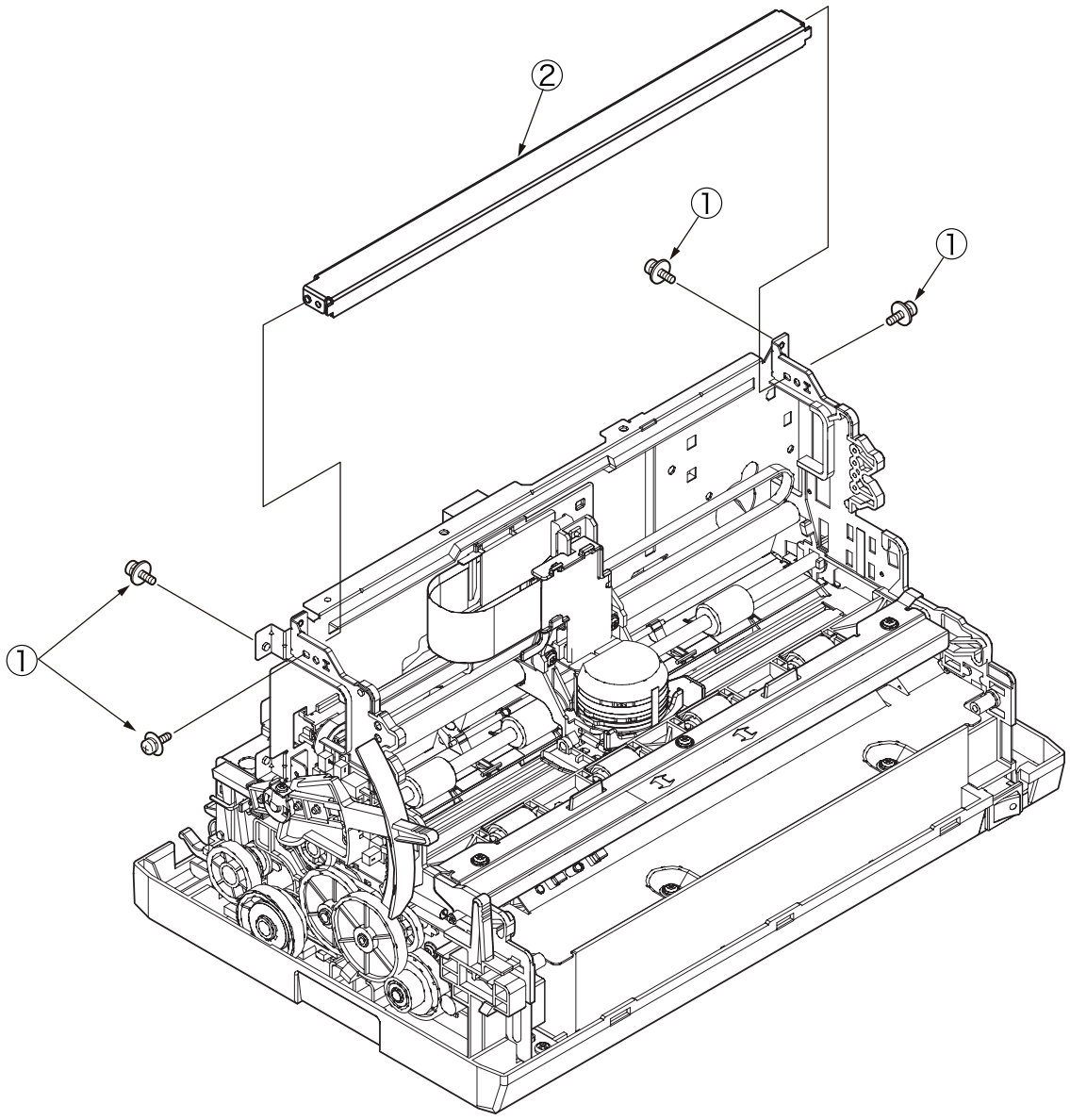
(3) Remove the two screws ①.

(4) Remove the frame guide ②.

(5) Reinstall in the opposite sequence to removal.

(Precautions upon reinstalling)

1. Check and adjust the print head and platen after reinstalling the parts. (See 6.1)
2. To assemble the frame guide ②, push it in the direction of arrows against the space frame.



5.2.9 Slider Pice-Slider

(1) Remove the upper cover assembly. (See 5.2.3).

(2) Remove the control board. (See 5.2.4)

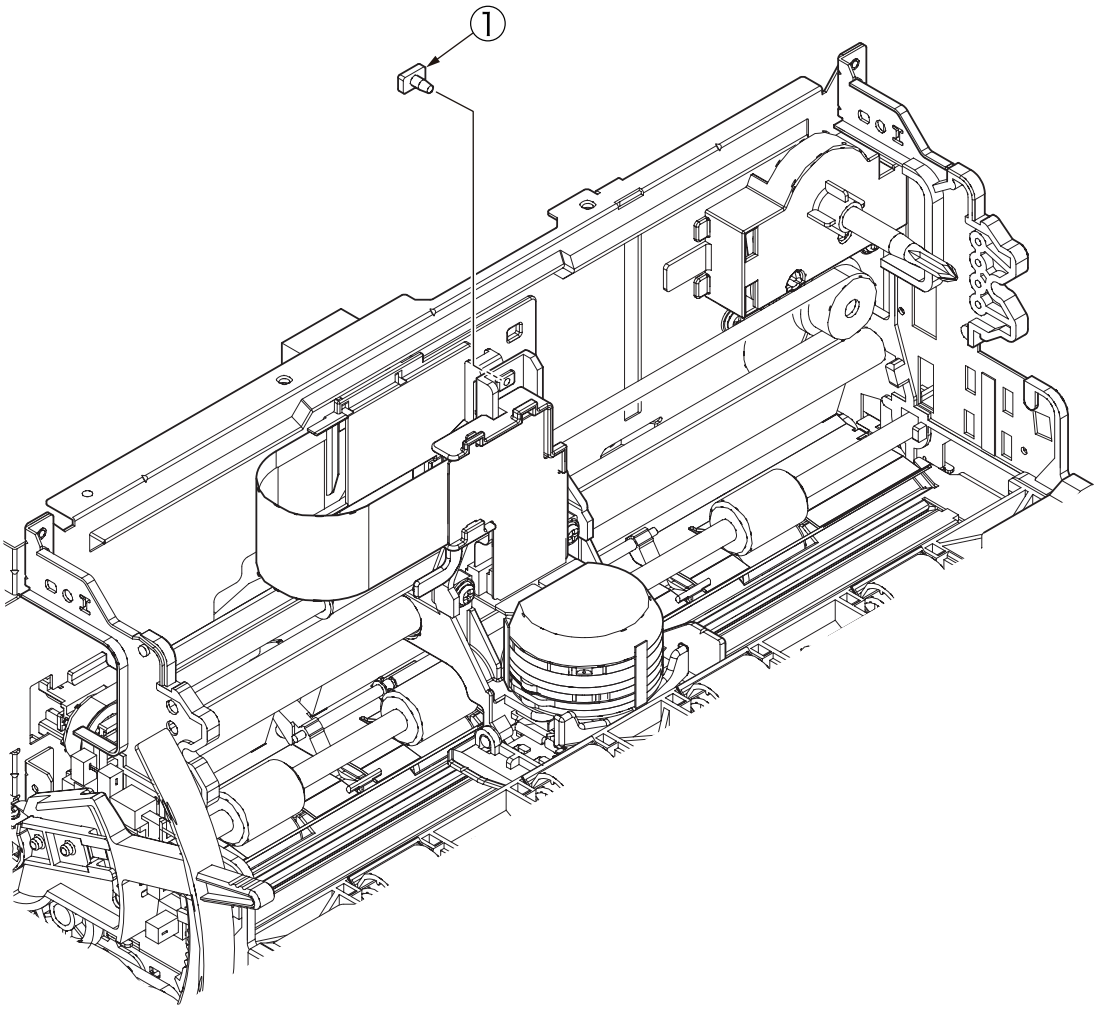
(3) Remove the frame guide. (See 5.2.8).

(4) Remove the slider piece ① from the carriage plate.

(5) Reinstall in the opposite sequence to removal.

(Precautions upon reinstalling)

1. Check and adjust the print head and platen after reinstalling the parts. (See 6.1)



5.2.10 Mini pitch belt

(1) Remove the print head. (See 5.2.1)

(2) Remove the upper cover assembly. (See 5.2.3)

(3) Push the idle pulley bracket in the direction indicated by the arrow and remove the mini pitch belt ① from the idle pulley.

(4) Remove the mini pitch belt ① from the pulley of the SP motor.

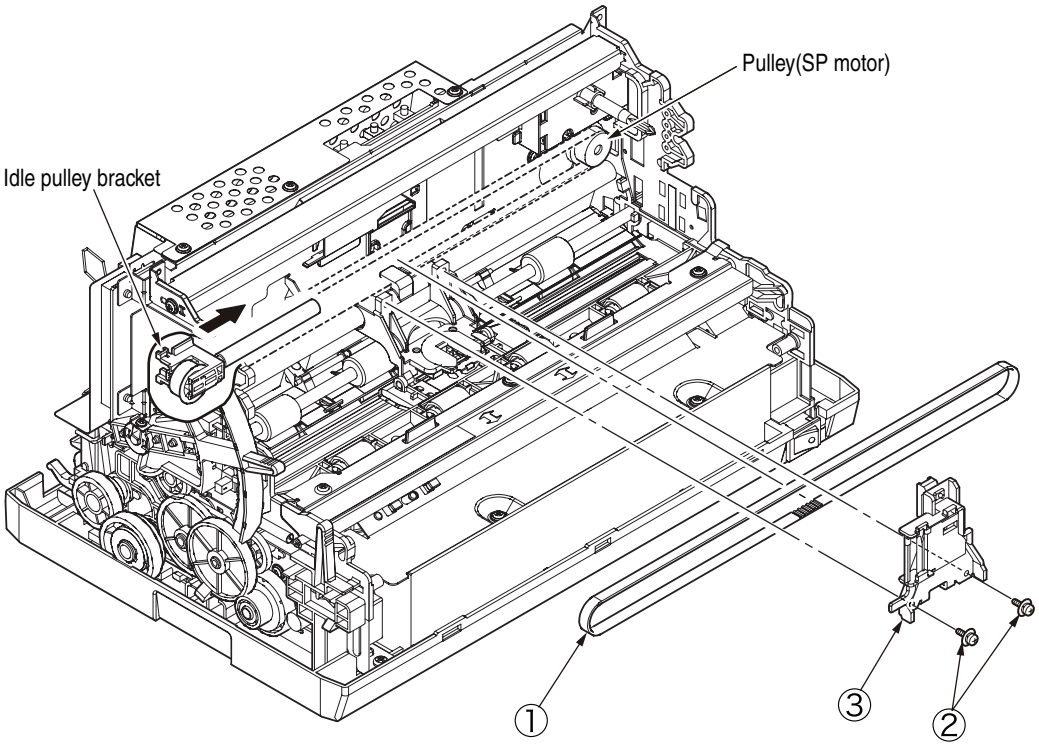
(5) Remove the two screws ②, then remove the carriage plate ③.

(6) Remove the mini pitch belt.

(7) Reinstall in the opposite sequence to removal.

(Precautions upon reinstalling)

1. Check and adjust the print head and platen after reinstalling the parts. (See 6.1)
2. When reinstalling the carriage plate ③, push it in the direction indicated by the arrow (against the carriage frame).



5.2.11 Pin Tractor Assembly

(1) Remove the upper cover assembly. (See 5.2.1)

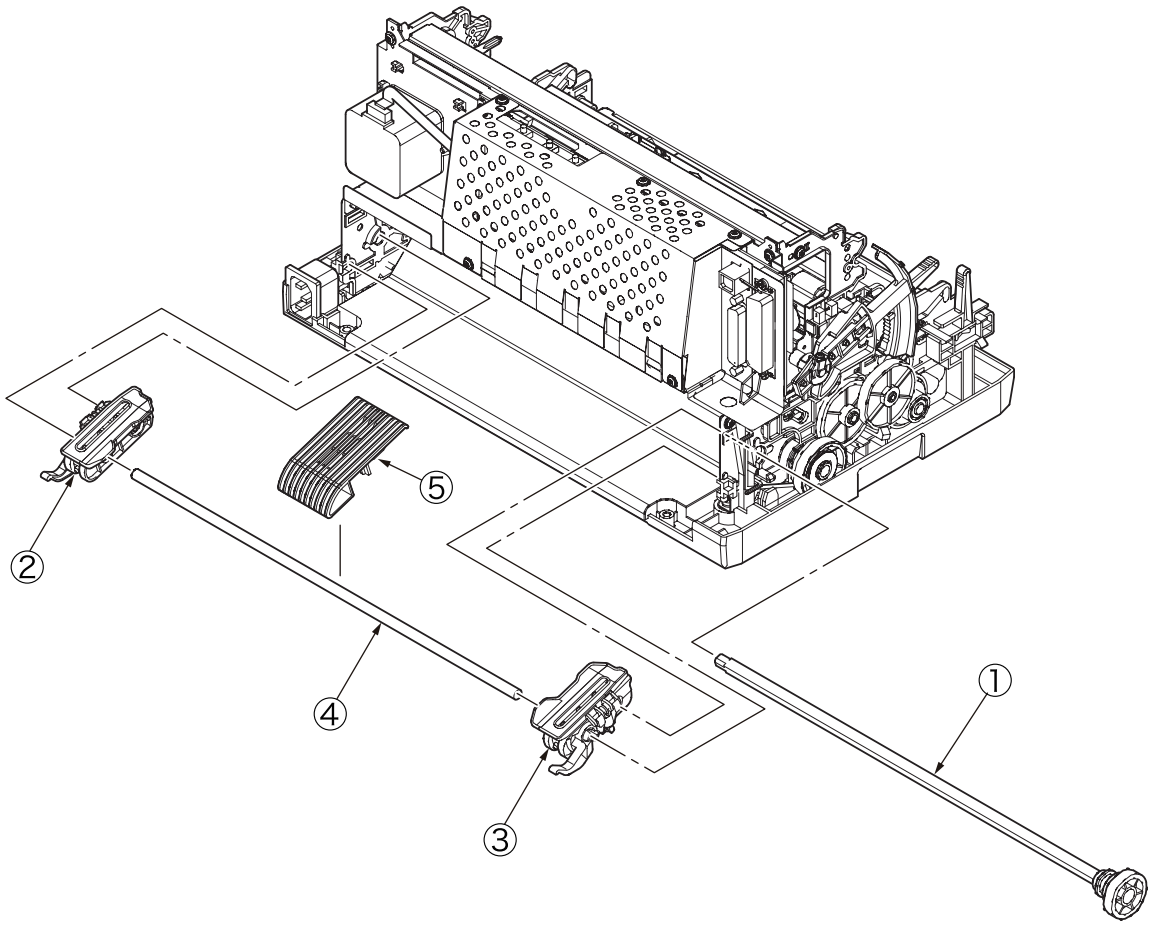
(2) Remove the tractor shaft ①.

(3) Remove the tractor assembly L ②, tractor assembly R ③, lock shaft ④, and center guide ⑤.

(4) Reinstall in the opposite sequence to removal.

(Precautions upon reinstalling)

1. When reinstalling the tractor shaft ①, the tractor assembly L ② must be in phase with the tractor assembly R ③.



5.2.12 Printer unit

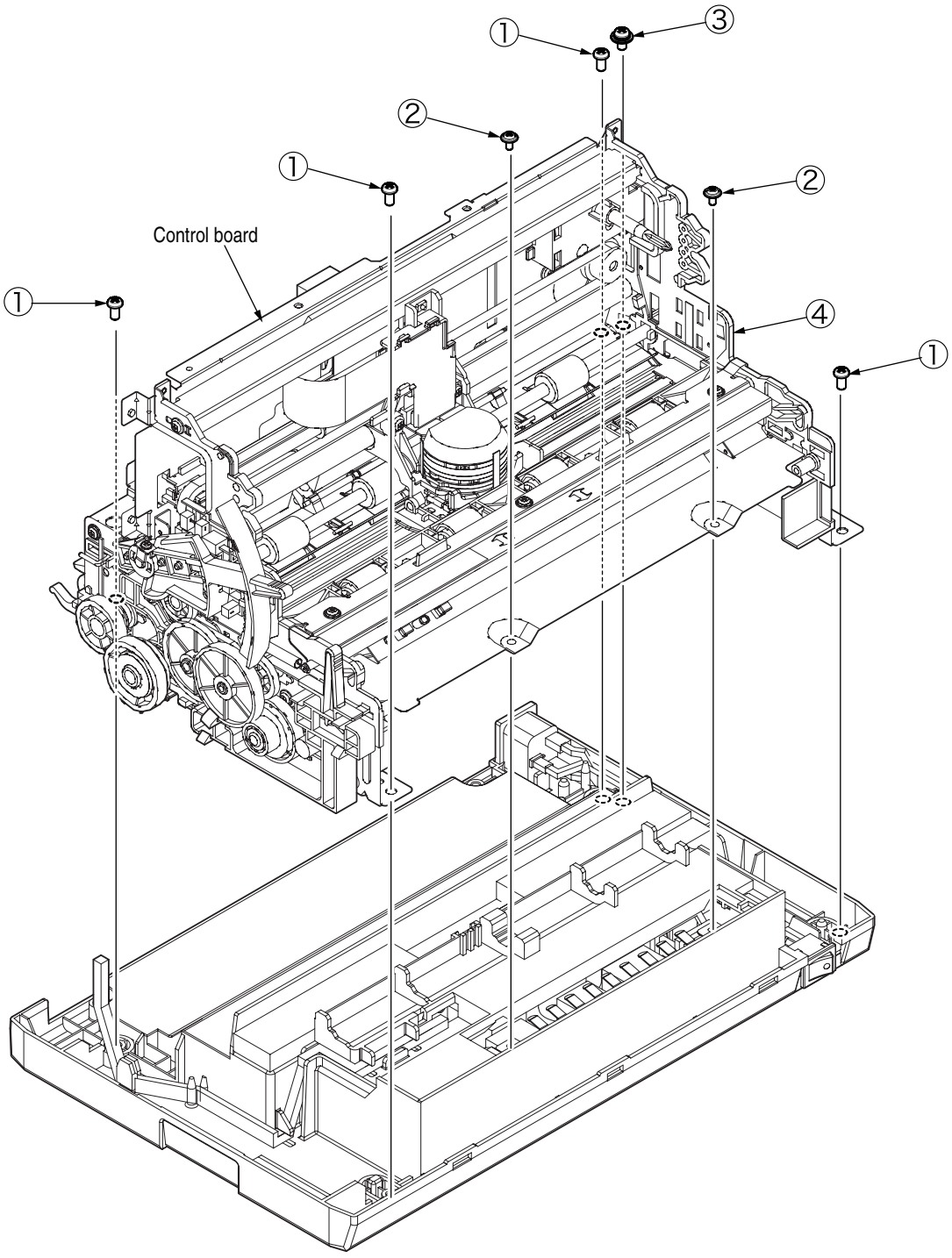
(1) Remove the upper cover assembly. (See 5.2.3)

(2) Remove the shield plate B and shield plate back. (See 5.2.4)

(3) Disconnect the connector (Power supply) from the control board.

(4) Remove the four screws ①, two screws ② and screw ③, then remove the printer unit ④.

(5) Reinstall in the opposite sequence to removal.



5.2.13 LF motor

(1) Remove the upper cover assembly. (See 5.2.3)

(2) Remove the printer unit. (See 5.2.12)

(3) Disconnect the LF motor connector from the control board.

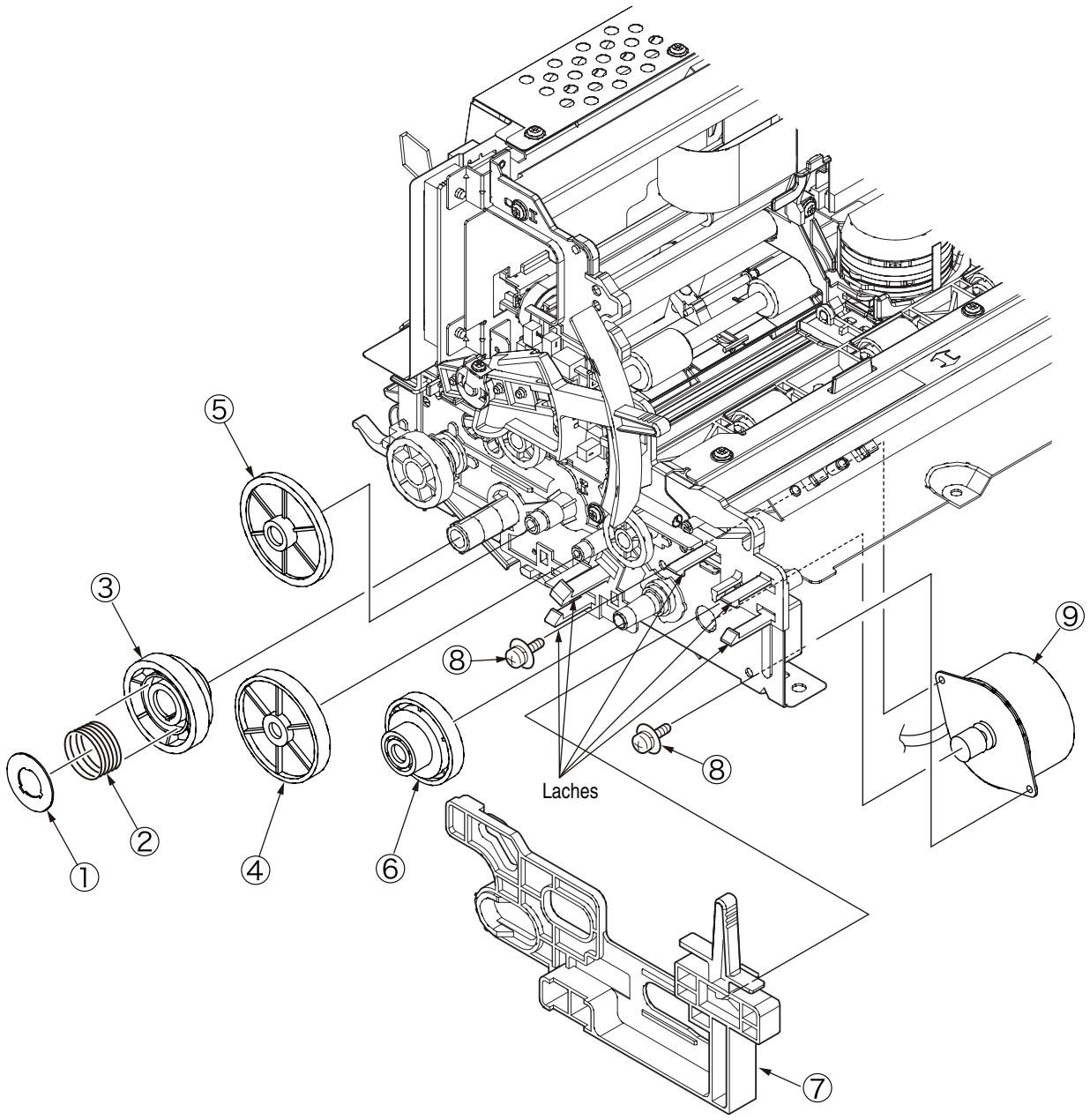
(4) Remove the washer ①, then remove the spring ② and change gear ③.

(5) Remove the idle gears ④, ⑤, and ⑥.

(6) Remove the five latches, then remove the change lever ⑦.

(7) Remove the two screws ⑧, then remove the LF motor ⑨.

(8) Reinstall in the opposite sequence to removal.



5.2.14 Table sensor, micro switch, photo sensor, sensor cord

(1) Remove the upper cover assembly. (See 5.2.3)

(2) Remove the printer unit. (See 5.2.12)

(3) Disconnect the sensor connector from the control board.

(4) Remove the screw ①, then remove the bush_adjust ② and lever_adjust ③.

(5) Remove the gap sensor 1 ④, gap sensor 2 ⑤, and carriage sensor ⑥.

(6) Remove the latch, then remove the sensor holder ⑦.

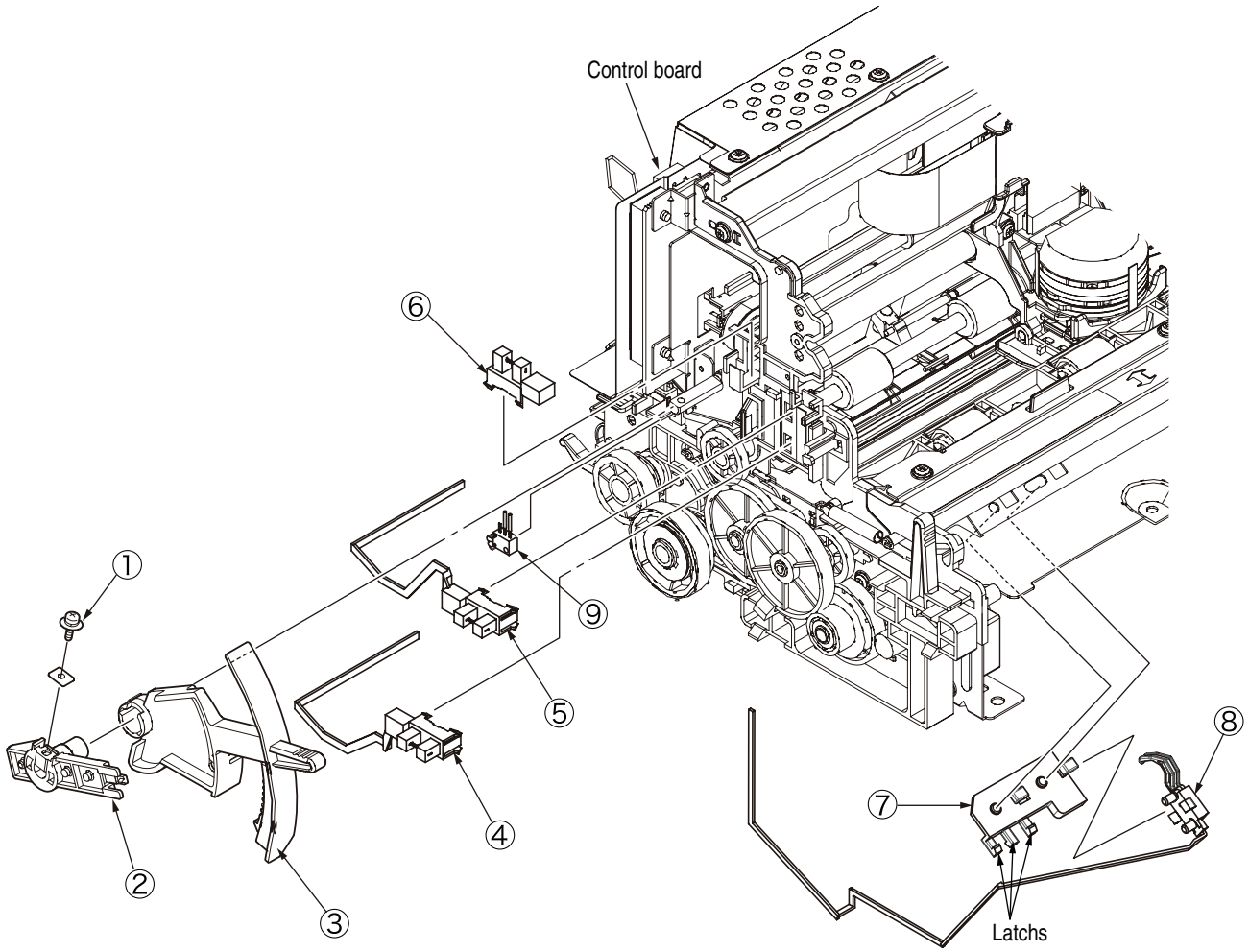
(7) Remove the table sensor ⑧ from the sensor holder ⑦.

(8) Disconnect the sensor cord ⑨ from the gap sensor 1 ④, gap sensor 2 ⑤, carriage sensor ⑥, table sensor ⑧.

(8) Reinstall in the opposite sequence to removal.

(Precautions upon reinstalling)

1. Check and adjust the print head and platen after reinstalling the parts. (See 6.1)



5.2.15 Power supply unit

⚠Warning	Risk of Electric Shock	⚠

There is a risk of electric shock during replacement of the low voltage power supply.

Use insulating gloves or avoid direct contact with any conducting part of the power supply, and caution should be exercised during replacement.

The capacitor may take one minute to complete discharge after the AC cord is unplugged. Also, there is a possibility that the capacitor doesn't discharge because of a breakage of the PCB, etc., so remember the possibility of electric shock to avoid electric shock.

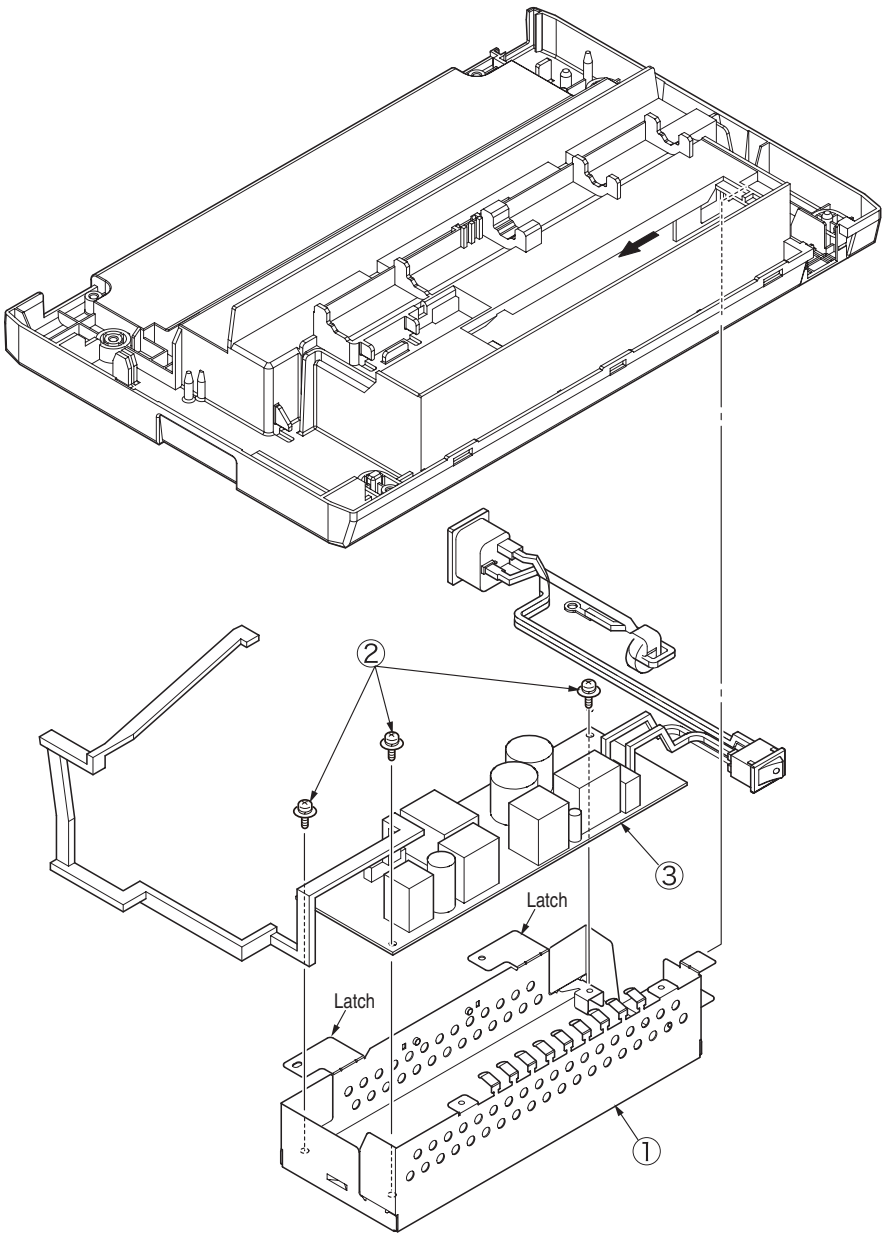
(1) Remove the upper cover assembly. (See 5.2.3)

(2) Remove the printer unit. (See 5.2.12)

(3) Remove the two latches , then move the shield plate_lower ① in the direction indicated by the arrow to remove it.

(4) Remove the three screws ②, then remove the power supply ③.

(5) Reinstall in the opposite sequence to removal.



6. ADJUSTING

- Adjustments must be made with the printer unit installed in the lower cover.
- Adjustments must be made by setting the printer on a secure assembly platform (plane level: 1mm or less) in order to minimize skewed adjustments.

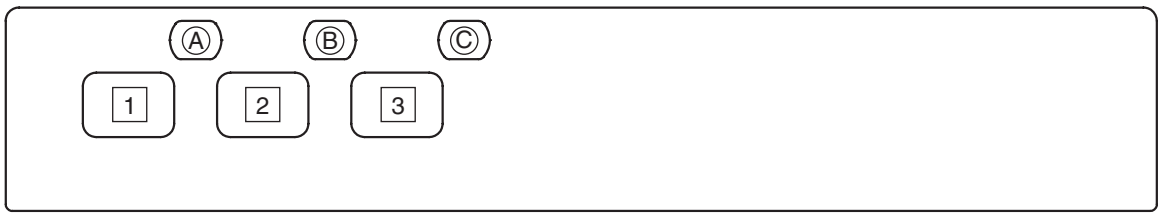
6.1 Adjusting the Gap Between the Platen and Print Head

Tools

- No. 2-200 Phillips screwdriver
- Thickness gauge

Adjusting Method

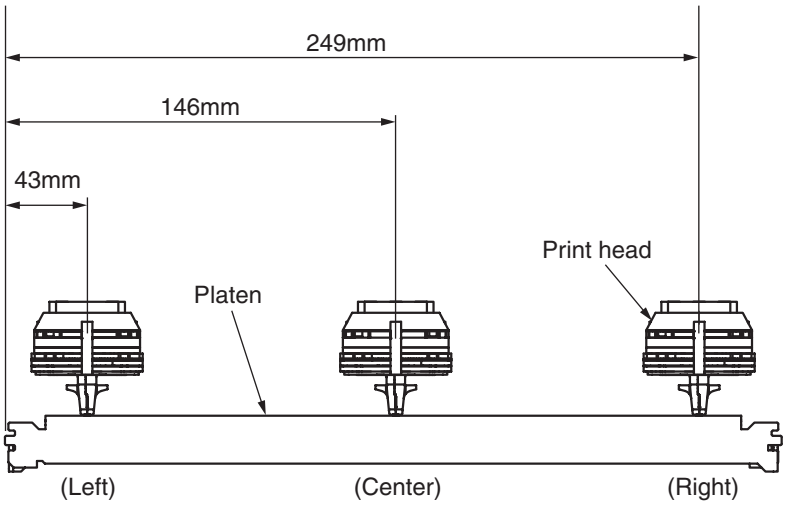
Allocation of switch lamps

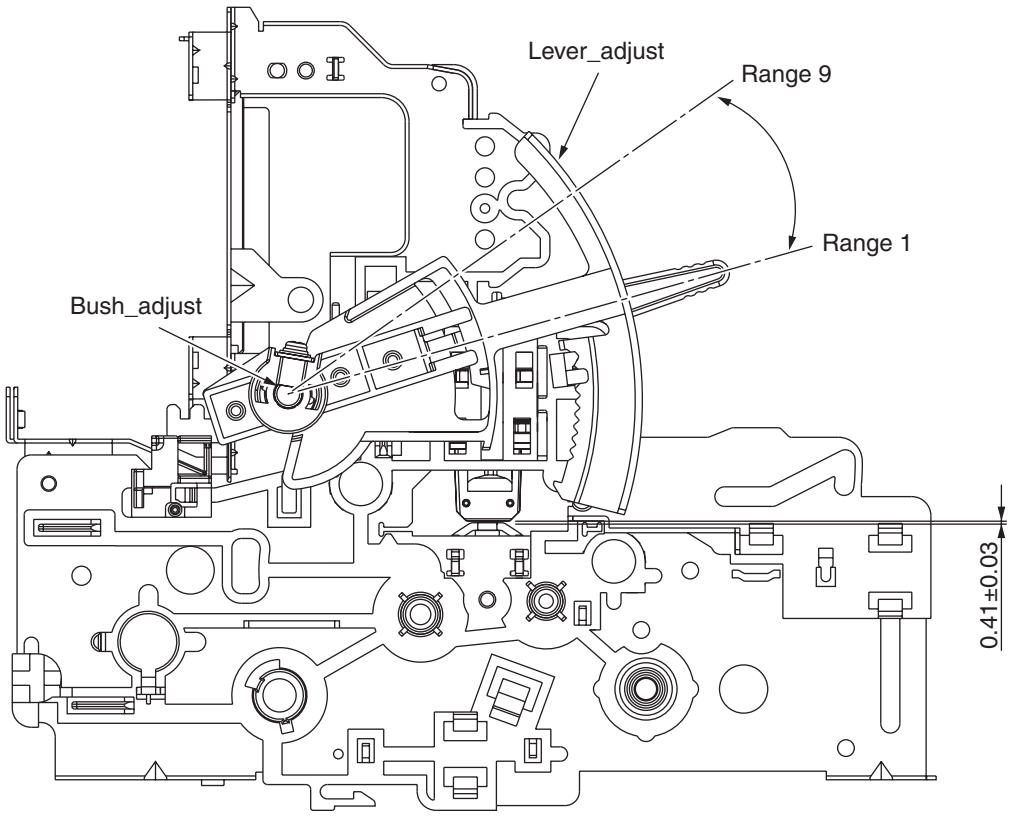


(1) Turn OFF the power switch.
(2) Remove the upper cover assembly. (See 5.2.3)
(3) Remove the ribbon cartridge.
(4) Set the adjust lever to [Range 1].
(5) Rotate the bush_adjust to adjust the space between the printer head and platen so that it is 0.38-0.44 mm at the center an right and left ends of the platen.
(6) After adjusting, set the ribbon cassette, then set a continuous form of 55kg ream weight to the tractor.
(7) Turn ON the power while pressing the switch [2] and confirm that a test print is performed properly.

CAUTION:

If the test print is not properly performed, check the gap adjustment values.

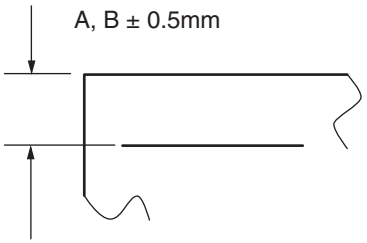




- Set the adjust lever to Range 1 for adjusting.
- Adjust the head gap by pressing the adjust lever lightly into the groove of the side frame so that there is no backlash between the adjust lever and groove.

6.2 First line position compensation

Specification



	First line position
Cut paper (Stage)	A±0.5mm
Continuous paper (Rear)	B±0.5mm

Adjusting Method

(1) A paper (1P 55kg paper) is set.
   1. A cut paper does after local printing mode carry out a paper set.
   2. Continuation paper is set to a rear tractor.

(2) A power supply is switched on pushing the key of a mentioned operation panel (Selection mode starting printing test)

(3) Local printing start.
   In the case of continuation paper ③ of an operation panel key is pushed.
   In the case of cut sheet a paper is set on a table.

(4) POWER OFF

(5) Check going into a standard value.

(6) When not going into a standard value it rectifies according to a follow table.

The method of compensation

A power supply is switched on pushing. ③ (Menu mode)

An item is united by ① (or ① pushing ③) key.

A compensation value is chosen (or ② pushing ③) key.

If a target setting value is reached, ③ switch pushing, ① and ② switch are pushed simultaneously and it is made to complete.

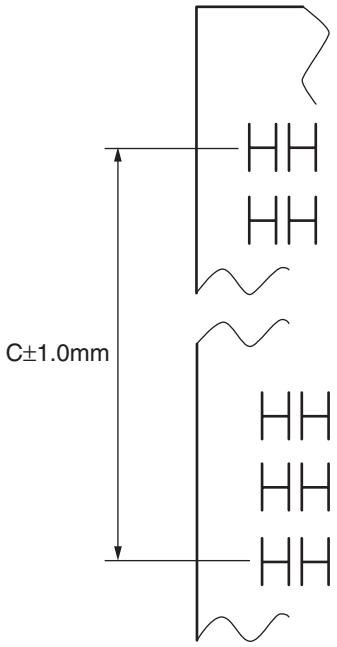
[ML5100FB]

Adjusting Method

Preset	Correction
+7	Move 7/60 inch (2.96 mm) down from the reference position.
+6	Move 6/60 inch (2.54 mm) down from the reference position.
+5	Move 5/60 inch (2.12 mm) down from the reference position.
+4	Move 4/60 inch (1.69 mm) down from the reference position.
+3	Move 3/60 inch (1.27 mm) down from the reference position.
+2	Move 2/60 inch (0.85 mm) down from the reference position.
+1	Move 1/60 inch (0.42 mm) down from the reference position.
0	Reference position
-1	Move 1/60 inch (0.42 mm) up from the reference position.
-2	Move 2/60 inch (0.85 mm) up from the reference position.
-3	Move 3/60 inch (1.27 mm) up from the reference position.
-4	Move 4/60 inch (1.69 mm) up from the reference position.
-5	Move 5/60 inch (2.12 mm) up from the reference position.
-6	Move 6/60 inch (2.54 mm) up from the reference position.
-7	Move 7/60 inch (2.96 mm) up from the reference position.

6.3 The amount compensation of 40 lines

Specification



C=4.233 × 39=165.09mm

Adjusting Method

(1) PC for an examination is connected. It is made OKI mode.
(2) A paper (1P / 55kg) is set toa table.
(3) Examination data is printed from PC for an examination.
(4) Power supply OFF after printing.
(5) Check going into the standardvalue.
(6) When not going into a standard value, it rectifies according to a follow table.

The method of compensation

A power supply is switched on pushing ③ (Menu mode).

① switch (or while pushing ③ switches ① switch) is pushed, and an item is determined.

A compensation value is chosen ② (or ② pushing ③) key.

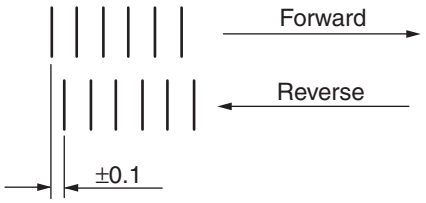
If a target setting value is reached, ③ switch pushing, ① and ② switch are pushed simultaneously and it is made to complete.

Preset	Correction
+14	Move 1 pitch (1/720”) forward every 55/360” from the reference position.
+13	Move 1 pitch (1/720”) forward every 59/360” from the reference position
+12	Move 1 pitch (1/720”) forward every 64/360” from the reference position
+11	Move 1 pitch (1/720”) forward every 69/360” from the reference position
+10	Move 1 pitch (1/720”) forward every 76/360” from the reference position
+9	Move 1 pitch (1/720”) forward every 85/360” from the reference position
+8	Move 1 pitch (1/720”) forward every 96/360” from the reference position
+7	Move 1 pitch (1/720”) forward every 109/360” from the reference position.
+6	Move 1 pitch (1/720”) forward every 127/360” from the reference position.
+5	Move 1 pitch (1/720”) forward every 153/360” from the reference position.
+4	Move 1 pitch (1/720”) forward every 191/360” from the reference position.
+3	Move 1 pitch (1/720”) forward every 255/360” from the reference position.
+2	Move 1 pitch (1/720”) forward every 382/360” from the reference position.
+1	Move 1 pitch (1/720”) forward every 764/360” from the reference position.
0	Reference position
-1	Move 1 pitch (1/720”) back every 764/360” from the reference position.
-2	Move 1 pitch (1/720”) back every 382/360” from the reference position.
-3	Move 1 pitch (1/720”) back every 255/360” from the reference position.
-4	Move 1 pitch (1/720”) back every 191/360” from the reference position.
-5	Move 1 pitch (1/720”) back every 153/360” from the reference position.
-6	Move 1 pitch (1/720”) back every 127/360” from the reference position.
-7	Move 1 pitch (1/720”) back every 109/360” from the reference position.
-8	Move 1 pitch (1/720”) back every 96/360” from the reference position.
-9	Move 1 pitch (1/720”) back every 85/360” from the reference position.
-10	Move 1 pitch (1/720”) back every 76/360” from the reference position.
-11	Move 1 pitch (1/720”) back every 69/360” from the reference position.
-12	Move 1 pitch (1/720”) back every 64/360” from the reference position.
-13	Move 1 pitch (1/720”) back every 59/360” from the reference position.
-14	Move 1 pitch (1/720”) back every 55/360” from the reference position.

6.4 Compensation of a printing gap of both directions

Specification

- Low Speed ±0.1 mm or less
- Normal Speed ±0.1 mm or less
- High1 Speed ±0.15 mm or less
- High2 Speed ±0.15 mm or less



Correct print registration in the forward direction if the output is reversed.
Check the registration both on a cut sheet and a continuous form.

Adjusting Method

A test pattern is mode to print and it checks that the right and left direction printing gap is less than a standard value.
(Perform this adjustment and a check by the whole printing width.)

When not going into a standard value, it rectifies according to a follow table.

The method of compensation

A power supply is switched on pushing ③ (Menu mode)

① switch (or while pushing ③ switches ① switch) is pushed, and an item is determined.

A compensation value is chosen ② (or ② pushing ③) key.

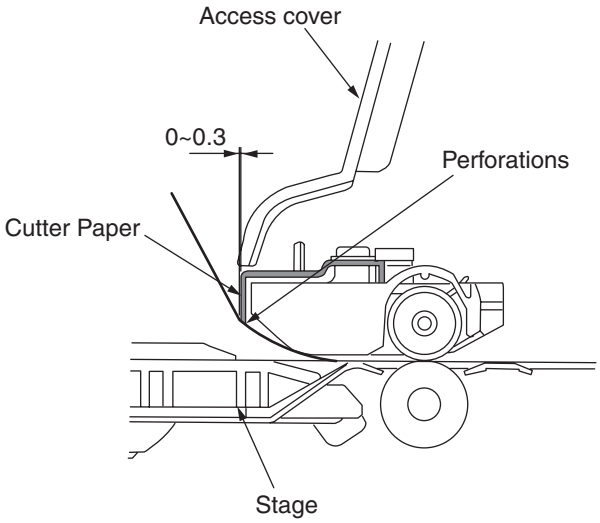
If a target setting value is reached, ③ switch pushing, ① and ② switch are pushed simultaneously and it is made to complete.

Preset	Correction
+10	Move 0.35 mm to the right from the reference position.
+9	Move 0.315 mm to the right from the reference position.
+8	Move 0.28 mm to the right from the reference position.
+7	Move 0.245 mm to the right from the reference position.
+6	Move 0.21 mm to the right from the reference position.
+5	Move 0.175 mm to the right from the reference position.
+4	Move 0.14 mm to the right from the reference position.
+3	Move 0.105 mm to the right from the reference position.
+2	Move 0.07 mm to the right from the reference position.
+1	Move 0.035 mm to the right from the reference position.
0	Reference position
-1	Move 0.035 mm to the left from the reference position.
-2	Move 0.07 mm to the left from the reference position.
-3	Move 0.105 mm to the left from the reference position.
-4	Move 0.14 mm to the left from the reference position.
-5	Move 0.175 mm to the left from the reference position.
-6	Move 0.21 mm to the left from the reference position.
-7	Move 0.245 mm to the left from the reference position.
-8	Move 0.28 mm to the left from the reference position.
-9	Move 0.28 mm to the left from the reference position.
-10	Move 0.35 mm to the left from the reference position.

6.5 Paper cut position compensation

Specification

- 0~0.3 mm



Adjusting Method

(1) Continuation paper (1p, 55kg, 10 inch) is set to a tractor
(2) Power supply
(3) After push ③ and feed paper, push ③ send a paper to a paper cut position and check that perforation stop within a standard value.

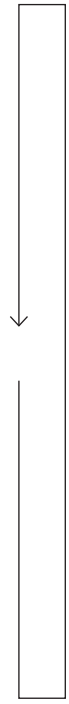
When not going into a standard value it rectifies according to a follow table.
The method of compensation.

A power supply is switched on pushing ③ switch. (Menu mode)

① switch (or while pushing ③ switches ① switch) is pushed, and an item is determined.

A compensation value is chosen ② (or ② pushing ③) key.

If a target setting value is reached, ③ switch pushing, ① and ② switch are pushed simultaneously and it is made to complete.



Preset	Correction
+7	Move 7/90 inch (1.98 mm) down from the reference position.
+6	Move 6/90 inch (1.69 mm) down from the reference position.
+5	Move 5/90 inch (1.41 mm) down from the reference position.
+4	Move 4/90 inch (1.13 mm) down from the reference position.
+3	Move 3/90 inch (0.85 mm) down from the reference position.
+2	Move 2/90 inch (0.56 mm) down from the reference position.
+1	Move 1/90 inch (0.28 mm) down from the reference position.
0	Reference position
-1	Move 1/90 inch (0.28 mm) up from the reference position.
-2	Move 2/90 inch (0.56 mm) up from the reference position.
-3	Move 3/90 inch (0.85 mm) up from the reference position.
-4	Move 4/90 inch (1.13 mm) up from the reference position.
-5	Move 5/90 inch (1.41 mm) up from the reference position.
-6	Move 6/90 inch (1.69 mm) up from the reference position.
-7	Move 7/90 inch (1.98 mm) up from the reference position.

7. MAINTENANCE TEST

7.1 Selecting the Test Mode

The switches on the operator panel have the functions indicated in Table 7-1 so that various tests can be conducted for maintenance.
To start the test in Table 7-1, turn power ON while pressing the switch marked with the ○.
In maintenance mode 1, maintenance mode 2, or print test selection mode test, start the test in Table 7-2 by pressing the switch marked with the ○ while at the same time holding down the switch marked with the ●.

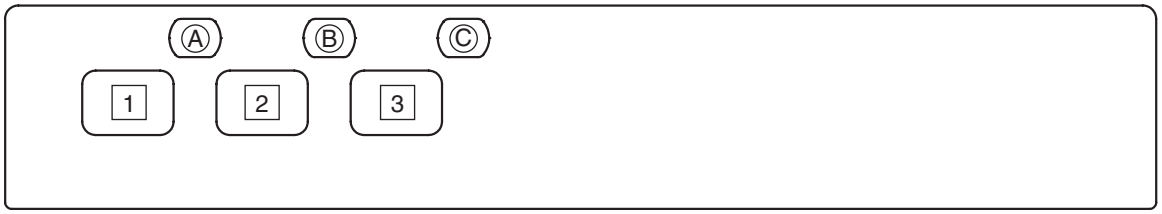
Table 7-1

Operator Panel Switch			Test Items
1	2	3	
	○		6 inch per pattern
	○	○	All letter test
		○	Menu mode. (See 7.2)
○		○	Function setup menu default setting (Note 2)
○	○		Maintenance mode 1
○	○	○	Maintenance mode 2
○			Print test selection mode

Table 7-2

Modes	Operator Panel Switch			Test Items
	1	2	3	
Maintenance mode 1	●		○	Maintenance Menu mode. (See 7.2)
		○	●	Correction of horizontal print position (English)
		●	○	Sensor check mode
	○	●		8 inch/continuous pattern
Maintenance mode 2		●	○	Flash loading mode
Print test selection mode		●	○	Skip/continuous pattern
	○	●		Hexadecimal dump (Note 1)

Allocation of switch lamps



Caution:

1. Hexadecimal dump is a mode in which all data sent from the host computer to the printer are printed in hexadecimal.
2. With [function setup menu default setting] items excluding the mechanism correction value will return to default.

7.2 Setting the Menu

7.2.1 Items in the menu

Underlined values are by factory default.

Item	Function	Remark
Emulation Mode	Select EPSON LQ mode, IBM PPR mode, or IBM X24 AGM mode.	IBM PPR IBM AGM EPSON LQ
Print Mode	Select quality of ANK characters. OCR-A and OCR-B are displayed only on printers specifically for OEL.	LQ Courier LQ Roman LQ Swiss LQ Swisss Bold LQ Orator LQ Gothic LQ Prestige LQ OCR-A (OEL only) LQ OCR-B (OEL only) Utility HSD
Pitch	Select character pitch.	10CPI 12CPI 15CPI 17.1CPI 20CPI
Proportional Spacing	Select whether to use proportional spacing or not.	Yes No
Style	Select either font style.	Normal Italics
Size	Select the character scale size.	Single Double
Character Set	Select either ANK character code table.	Set I *ODA/AOS Set II *OEL

Underlined values are by factory default.

Item	Function	Remark
Language Set	Select a language character set. (OEL)	ASCII French German British Danish I Swedish I Italian Spanish I Japanese Norwegian Danish II Spanish II Latin American French Canadian Dutch Swedish II Swedish III Swedish IV Turkish Swiss I Swiss II Publisher
Language Set	Select a language character set. (ODA/AOS)	American French German British Danish I Swedish Italian Spanish I Japanese Norwegian Danish II Spanish II Latin American French Canadian Dutch Publisher
Zero Character	Select either print font pattern to receive a zero character located at 30H in ANK code or at AA30H in a single-byte code.	Unslashed *OEL Slashed *ODA/AOS

Underlined values are by factory default.

Item	Function	Remark
Code Page	Select a code page.	[OEL] USA Canada French Multilingual Portugal Norway Turkey Greek_437 Greek_869 Greek_928 Grk_437 CYPRUS Polska Mazovia Serbo Croatic I Serbo Croatic II ECMA-94 Hungarian CWI Windows Greek Windows East Europe Windows Cyrillic East Europe Latin II-852 Cyrillic I-855 Cyrillic II-866 Kamenicky(MJK) ISO Latin 2 Hebrew NC (862) Hebrew OC Turkey_857 Latin 5 (Windows Turkey) Windows Hebrew Ukrainian Bulgarian ISO Latin 6 (8859/10) Windows Baltic Baltic_774 KBL-Lithuanian Cyrillic Latvian Roman-8 Icelandic-861 Multilingual 858 ISO 8859-15 Greek_737 Asmo449+ Asom708 Arabic864 Windows Arabic POL 1 Macedonian
		[ODA/AOS] USA Canada French Multilingual Portugal Norway BRASCII Abicomp Multilingual 858 ISO8859-15

Underlined values are by factory default.

Item	Function	Remark
Slashed Letter 0 *OEL only	Set whether to convert slashed 0 located at 9BH and 9DH in USA code page or not. This item is displayed only on printers specifically for OEL.	Yes No
Multi Pass	Select the printing direction when double-height print data exists in a line.	Bi-directional Uni-directional
Rcv Buffer	Select size of the received buffer.	0 32K 64K
Print Suppress Effective	Set whether to enable or disable a print suppress setup command.	Yes No
Auto LF	Select whether to perform auto LF operation or not upon receiving a CR code.	Yes No
Auto CR *IBM PPR only	Select whether to perform auto CR operation upon receiving a carriage return command.	Yes No
SI Select Pitch (10CPI) *IBM PPR/AGM only	Set how to handle an SI command received in 10CPI mode.	15CPI 17.1CPI
SI Select Pitch (12CPI) *IBM PPR/AGM only	Set how to handle an SI command received in 12CPI mode.	12CPI 20CPI
Reset Inhibit	Set whether to enable or disable an initial command.	No Yes
Select Language Set *OEL/EPSON only	Set whether to enable or disable a combination of the code page setting and the language setting by menu. This item is displayed only on printers specifically for OEL.	Combined Code Pege Only
Impact Mode	Select print mode upon power on. (This item is referred to upon initialization only by I-PRIME or power on but not by an initialization command and such.)	Normal Quiet Hi Copy
Print Direction Command	Select the validity of a one-way print setup command.	Valid Invalid
Print Speed Command	Select the validity of a print speed setup command.	Valid Invalid
Page Length Command	Select the validity of a page length command.	Valid Invalid
LF Pitch Command	Select the validity of a linefeed pitch command.	Valid Invalid
Font Command	Select the validity of a font command.	Valid Invalid
Pitch Command	Select the validity of a character pitch command.	Valid Invalid
Power Save Time	Set idle time to enter power save mode while power save mode is enabled.	5 min 10 min 15 min 30 min 60 min
PE Detection	Select whether to detect paper end or not.	OFF ON

Underlined values are by factory default.

Item	Function	Remark
Table Print	Set whether to divide a path or not to print on occasions when printing by the same headpin continues for 3 inches or more in the same pint block.	Standard Special
Carriage Position when cut sheet Gap 1	Selects the carriage position for cut-sheet paper fed (gap range 1).	Left Middle Right
Carriage Position when cut sheet Gap >1	Selects the carriage position for cut-sheet paper fed (gap range 2 or more).	Left Middle Right
Paper Width Mode	Selects a continuous-form paper width used. Mode1 should be selected for using 8 or more inch-wide paper. Mode2 should be selected for using 5 or more but less than 8 inch-wide paper. Mode3 should be selected for using less than 5 inch-wide paper.	Mode1 Mode2 Mode3
Continuous paper top LF adjust Gap 1	Selects a (gap range 1) continuous-form paper top LF correction amount. The positive settings for this option add correction amounts to the amount of LF, and the negative settings for the option reduce the amount of LF by correction amounts. The option adjusts the amount of LF in 1/360 inch increments.	+3~+1 0 -3~-1
Continuous paper top LF adjust Gap 2	Selects a (gap range 2) continuous-form paper top LF correction amount. The positive settings for this option add correction amounts to the amount of LF, and the negative settings for the option reduce the amount of LF by correction amounts. The option adjusts the amount of LF in 1/360 inch increments.	+3~+1 0 -3~-1
Continuous paper top LF adjust Gap 3	Selects a (gap range 3) continuous-form paper top LF correction amount. The positive settings for this option add correction amounts to the amount of LF, and the negative settings for the option reduce the amount of LF by correction amounts. The option adjusts the amount of LF in 1/360 inch increments.	+3~+1 0 -3~-1
Continuous paper top LF adjust Gap 4	Selects a (gap range 4) continuous-form paper top LF correction amount. The positive settings for this option add correction amounts to the amount of LF, and the negative settings for the option reduce the amount of LF by correction amounts. The option adjusts the amount of LF in 1/360 inch increments.	+3~+1 0 -3~-1
Line Spacing	Select line feed pitch.	6LPI 8LPI
Form Tear-Off	Select manual or auto as the method to advance a continuous form to the form tear-off position.	Off 500ms 1sec 2sec
Skip Over Perforation	Select whether to skip over perforation or not. (When a skip over perforation setup command is received, the received command is given priority.)	Yes No

Underlined values are by factory default.

Item	Function	Remark
Page Length (Continuous)	Select the length of a continuous form.	3.5" 4" 5.5" 6" 7" 8" 8.5" 11" *ODA/AOS 11 2/3" 12" *OEL 14" 17" 5" 3" 3.25"
TOF (Continuous)	Select the reference position for the TOF position when auto loading continuous form paper from the rear end. (Up to the mid-section of characters in the first line.) "1Chr. Set Pos." is printed if the TOF position is set by using SHIFT + PARK switches.	2.12mm(1/12") 4.23mm(1/6") 6.35mm(1/4") 8.47mm(1/3") 10.58mm(5/12") 12.7mm(1/2") 14.82mm(7/12") 16.93mm(2/3") 19.05mm(3/4") 21.17mm(5/6") 23.28mm(11/12") 25.4mm(1") 27.52mm(13/12") 1Chr. Set Pos.
Initial Position	This is the position of paper when paper is already loaded at power on. (For continuous form mode only.)	Print Tear OFF
Auto Eject Position	Select a printable area at the bottom of cut sheets of paper in cut-paper mode (the character center position).	6.35mm(1/4") 14.8mm
Page Length (Cut Sheet)	Select the page length of cut-paper.	3.5" 4" 5.5" 6" 7" 8" 8.5" 11" *ODA 11 2/3" *OEL/AOS 12" 14" 16.57" (OEL only) 17" (ODA/AOS only) 5" 3" 3.25"

Underlined values are by factory default.

Item	Function	Remark
TOF (Cut Sheet)	Select the reference position for the TOF position when feeding cut-paper in manual mode. (Up to the mid-section of characters in the first line.) "1Chr. Set Pos." is printed if the TOF position is set by using SHIFT + PARK switches.	2.12mm(1/12") 4.23mm(1/6") 6.35mm(1/4") 8.47mm(1/3") 10.58mm(5/12") 12.7mm(1/2") 14.82mm(7/12") 16.93mm(2/3") 19.05mm(3/4") 21.17mm(5/6") 23.28mm(11/12") 25.4mm(1") 27.52mm(13/12") 1Chr. Set Pos.
Wait Time	Select the waiting time between setting paper on the table and feeding it while the printer is waiting for paper to be fed in cut-paper manual feed mode.	500ms 1sec 2sec
FF Function	Set feeding operation upon receiving an FF code after cut-paper is fed.	Eject Form Feed
I-Prime	Select whether to print or clear buffer contents upon initialization by receiving I-PRIME.	Invalid Buffer Clear Buffer Print
Auto Feed XT *EPSON only	Set the validity of an Auto Feed XT signal.	Valid Invalid
I/F Bi-Direction	Set whether to return a device ID or not in accordance with IEEE1284.	Enable Disable
Parity	Select presence or absence of addition of parity bit and also select either even or odd parity bit. None : Absence of parity bit Odd : Odd parity Even : Even parity Ignore : Do not convert the character to 0x40 when parity error happened.	None Odd Even Ignore
Serial Data 7/8 Bits	Select the data bit length. 7: Data bit length is 7bit. 8: Data bit length is 8bit.	7 Blts 8 Blts
Protocol	Select an I/F Busy control method. Ready/Busy: Busy control by a DTR signal X-ON/X-OFF: Busy control by a DC3/DC1 code DTR&X-ON/X-OFF: Busy control DTR signal and DC3/DC1 control	Ready/Busy X-ON/X-OFF DTR&X-ON/X-OFF
Diagnostic Test	Select whether to perform input/output diagnosis of RS-232C interface signals. No: Not execute the self diagnostic function Yes: Execute the self diagnostic function	No Yes

Underlined values are by factory default.

Item	Function	Remark
Baud Rate	Select the data baud rate from the options. 300: Sets the data baud rate to 300 BPS 600: Sets the data baud rate to 600 BPS 1200: Sets the data baud rate to 1200 BPS 2400: Sets the data baud rate to 2400 BPS 4800: Sets the data baud rate to 4800 BPS 9600: Sets the data baud rate to 9600 BPS 19200: Sets the data baud rate to 19200 BPS	300 BPS 600 BPS 1200 BPS 2400 BPS 4800 BPS 9600 BPS <u>19200 BPS</u>
DTR Signal	Set a method to switch a DTR signal of a serial interface, by select/deselect or fix it to power on.	<u>Ready on Power UP</u> Ready on Select
Busy Time	Set the minimum time between BUSY to READY.	<u>0.2sec</u> 1 sec
TOF Adjustment (Cut Sheet)	Select an adjustment value for the reference position in regard to the TOF position of cut-paper/passbooks. The position moves to the rear end of the form by [+] and to the top of the form by [-] in 1/60 inch increments.	-7 ~ -1 <u>0</u> +7 ~ +1
Rear Load Adjustment	Select an adjustment value for the reference position in regard to the TOF position of a continuous form. The position moves to the rear end of the form by [+] and to the top of the form by [-] in 1/60 inch increments.	-7 ~ -1 <u>0</u> +7 ~ +1
Cut Position Adjust	Select an adjustment value for the position to cut the end of a continuous form. (In 1/90 inch increments)	-7 ~ -1 <u>0</u> +7 ~ +1
Registration Low	Adjust the print starting position upon printing in the reverse direction. (The position moves to the right or left in 1/720 inch increments.)	-10 ~ -1 <u>0</u> +10 ~ +1
Registration Normal	Adjust the print starting position upon printing in the reverse direction. (The position moves to the right or left in 1/720 inch increments.)	-10 ~ -1 <u>0</u> +10 ~ +1
Registration High1	Adjust the print starting position upon printing in the reverse direction. (The position moves to the right or left in 1/720 inch increments.)	-10 ~ -1 <u>0</u> +10 ~ +1
Registration High2	Adjust the print starting position upon printing in the reverse direction. (The position moves to the right or left in 1/720 inch increments.)	-10 ~ -1 <u>0</u> +10 ~ +1
LF Revise (Cut Sheet)	Adjust a line feed amount in cut-paper mode. (Note 1)	-14 ~ -1 <u>0</u> +14 ~ +1
LF Revise (Continuous) * Displayed in Maintenance Menu only	Adjust a line feed amount when printing a continuous form from the rear end.	-2 -1 <u>0</u> +1 +2

Underlined values are by factory default.

Item	Function	Remark
Centering For Feed * Displayed in Maintenance Menu only	Specify the centering position for a line feed. Mode1: Centering to the 8th character's position to feed a continuous form from the rear end by 2 ranges or more and 2/3-inch and more Mode2: Centering to the 5th character's position to feed a continuous form from the rear end by 2 ranges or more and 2/3-inch and more Mode3: Centering to the 8th character's position to feed either continuous form from the rear end or cut-paper Mode4: No centering by a line feed	Mode1 Mode2 Mode3 Mode4
Position Check * Displayed in Maintenance Menu only	Switch settings for position check of the print head. Check1: Homing when shifting from OFFLINE to ONLINE by pressing a switch with a standard setting and when exiting the power save mode Check2: Homing when printing is started by data reception after no operation of enhancement setting or printing for more than 3 minutes, and at the time of cut-paper feeding or a continuous form auto loading (before loading) Check3: Adds the following actions to those performed by Check 1. (1) In cut-paper mode Performs homing upon completion of ejection. Performs homing if the head is at a different position from the homing sensor (assuming it was moved by hand) at the time of paper feed. (2) In continuous form mode Performs homing after completion of retraction. Performs homing when the form feed switch is pressed with no paper. Performs homing if the head is at a different position from the homing sensor (assuming it was moved by hand) at the time of paper feed.	Check1 Check2 Check3
SP Check * Displayed in Maintenance Menu only	Checking the starting point of the head for a continuous form.	Valid Invalid
Slack Adjust (Continuous) * Displayed in Maintenance Menu only	Set whether to execute slack adjustment for paper or not in use of a rear tractor.	Valid Invalid
Centering For Paper Top (Continuous) * Displayed in Maintenance Menu only	Select whether to apply centering or not to the 30th character before inserts line feeds until the top of form goes over the rear feed roller, in continuous form mode. Valid: Apply centering Invalid: Not apply centering	Valid Invalid

Underlined values are by factory default.

Item	Function	Remark
Image Print Speed * Displayed in Maintenance Menu only	Select image print speed. • Image print at the speed of DOWN (80%) for Normal • Image print at the normal speed (100%) for Special	Normal <u>Special</u>
CPU Compensation * Displayed in Maintenance Menu only	Set data latch timing and ACK-BUSY signal output timing in regard to Centronics interface signals. Standard: Busy signal output at the center of ACK Special: Busy signal output at the falling edge of ACK	<u>Standard</u> Special
I/F Timing Set * Displayed in Maintenance Menu only	Set data latch timing and STB-BUSY signal output timing in regard to Centronics interface signals. New: Busy signal output and data latch at the falling edge of STB Old: Busy signal output and data latch at the rising edge of STB Special: Busy signal output at the falling edge of STB and data latch at the rising edge of STB	New Old <u>Special</u>
Power Saving	Set whether to enable or disable power save mode.	<u>Enable</u> Disable
Time Out Print * Displayed in Maintenance Menu only	This is to set or cancel the 150 ms timeout print mode.	<u>Valid</u> Invalid
Paper length compensation * Displayed in Maintenance Menu only	Compensation in increments of 0.35 mm for setting page length by MENU and Command.	-4.23mm -3.88mm -3.53mm -3.18mm -2.82mm -2.47mm -2.12mm -1.76mm -1.41mm -1.06mm -0.71mm -0.35mm <u>0</u> +0.35mm +0.71mm +1.06mm +1.41mm +1.76mm +2.12mm +2.47mm +2.82mm +3.18mm +3.53mm +3.88mm +4.23mm
Paper length compensation adjust * Displayed in Maintenance Menu only	Compensation in increments of 1/360 inch for setting page length by MENU and Command.	-4 ~ -1 <u>0</u> +1 ~ +4

Underlined values are by factory default.

Item	Function	Remark
Multipart form print mode * Displayed in Maintenance Menu only	Enhances the copying capability for printing on multipart forms. Special: Reduces the print speed by 50% for the gap range 3 or more to enhance the copying capability (priority is given to the copying capability). Normal: Reduces the print speed by 80% for the gap range 3 or more (priority is given to the performance).	Normal Special
Select bottom Table * Displayed in Maintenance Menu only	Selects the bottom margin control table according to the sensor holder type.	Mode1 Mode2
Cut sheet PE position adjust * Displayed in Maintenance Menu only	Selects the adjustment value for Cut sheet auto eject position in 1/90 inch (0.28mm) increments. The adjustment range is from -2.82mm to +2.82mm.	-10 ~ -1 0 +1 ~ +10
Host Interface * Displayed in Maintenance Menu only	Select the Interface.	Auto Interface Parallel USB Serial
I/F Time Out * Displayed in Maintenance Menu only	Select the time out in selected the 'Auto Interface'.	15 sec 30 sec 45 sec 1 min 2 min 3 min 4 min 5 min

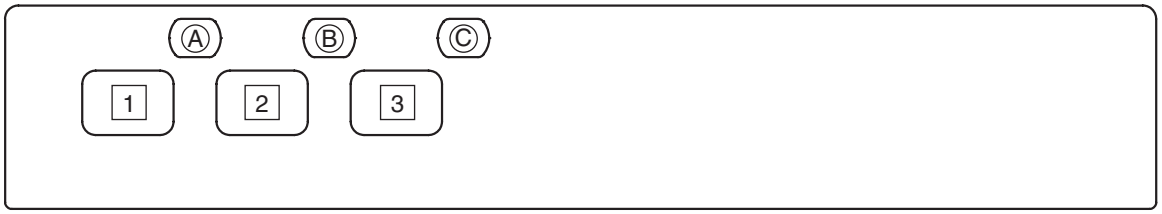
Note1 : Cut sheet LF accuracy adjustment, following the table below with TOF position as a standard.

Set value	Contents
+14	Add 1 pitch[0.035mm(1/720")] every 3.88mm(55/360")
+13	Add 1 pitch[0.035mm(1/720")] every 7.83mm(111/360")
+12	Add 1 pitch[0.035mm(1/720")] every 8.46mm(120/360")
+11	Add 1 pitch[0.035mm(1/720")] every 9.10mm(129/360")
+10	Add 1 pitch[0.035mm(1/720")] every 10.01mm(142/360")
+9	Add 1 pitch[0.035mm(1/720")] every 11.00mm(156/360")
+8	Add 1 pitch[0.035mm(1/720")] every 12.48mm(177/360")
+7	Add 1 pitch[0.035mm(1/720")] every 13.97mm(198/360")
+6	Add 1 pitch[0.035mm(1/720")] every 16.29mm(231/360")
+5	Add 1 pitch[0.035mm(1/720")] every 18.62mm(264/360")
+4	Add 1 pitch[0.035mm(1/720")] every 23.28mm(330/360")
+3	Add 1 pitch[0.035mm(1/720")] every 27.94mm(396/360")
+2	Add 1 pitch[0.035mm(1/720")] every 41.91mm(594/360")
+1	Add 1 pitch[0.035mm(1/720")] every 55.88mm(792/360")
0	No LF pitch adjustment
-1	Take 1 pitch[0.035mm(1/720")] every 55.88mm(792/360")
-2	Take 1 pitch[0.035mm(1/720")] every 41.91mm(594/360")
-3	Take 1 pitch[0.035mm(1/720")] every 27.94mm(396/360")
-4	Take 1 pitch[0.035mm(1/720")] every 23.28mm(330/360")
-5	Take 1 pitch[0.035mm(1/720")] every 18.62mm(264/360")
-6	Take 1 pitch[0.035mm(1/720")] every 16.29mm(231/360")
-7	Take 1 pitch[0.035mm(1/720")] every 13.97mm(198/360")
-8	Take 1 pitch[0.035mm(1/720")] every 12.48mm(177/360")
-9	Take 1 pitch[0.035mm(1/720")] every 11.00mm(156/360")
-10	Take 1 pitch[0.035mm(1/720")] every 10.01mm(142/360")
-11	Take 1 pitch[0.035mm(1/720")] every 9.10mm(129/360")
-12	Take 1 pitch[0.035mm(1/720")] every 8.46mm(120/360")
-13	Take 1 pitch[0.035mm(1/720")] every 7.83mm(111/360")
-14	Take 1 pitch[0.035mm(1/720")] every 3.88mm(55/360")

Note2 : Ruled lines print pattern at level print position adjustment is as follows.

7.2.2 Setting the menu

Allocation of switch lamps



(1) Turn OFF power.

(2) Load paper (ream weight of 55kg; cut-sheet) and the ribbon cartridge into the printer to prepare the printer.

(3) Turn On power while pressing switch [3] .
Please keep the switch pressed until the print head begins moving.

(4) The printer will print “Menu print?” Press switch [2] to print all current menu settings.

(5) Press switch [1] to print the menu options from left to right. (To print in the reverse order, press switch [1] while holding down switch [3].)

(Example)

CR code	CR	
		◀ Switch [1] is pressed.
Pe detect	ON	
		◀ Switch [1] is pressed.
Cat position adjust	0	

Repeatedly press switch [1] (while holding down switch [3]) until the printer prints the desired menu option.

(6) When the printer prints the desired menu option, press switch [2] (while holding down switch [3]). Press the switch repeatedly to cycle through all available menu settings.

(Example)

CR code	CR	
		◀ Switch [2] is pressed
CR code	CR+LF	

Press switch [2] (while holding down switch [3]) repeatedly until the printer prints the desired menu setting.

(7) Press switch [1]. (while holding down switch [3]) and repeat the above steps until you have changed all desired menu settings.

(8) To complete menu setting, press switch [2] while holding down switch [3], then press switch [1]. (i.e., depress all three switches). The printer will print “Save menu” then perform the same initialization as at power ON.

The last printed settings are stored in the printer.

Caution:

- If paper runs out during menu setting, reload paper and press switch [1] to proceed with setting.
- To save settings, press switch [2] while holding down switch [3], then press switch [1]. If the power is turned off before this is done, the settings will not be saved.
- Please note that the displayed menu options differ between English and Chinese. (The English menu provides more menu options.) Do not change these menu settings unless you need to use the printer under unusual circumstances. Normally, use the printer with its factory default configuration.

8. PROCEDURES FOR REPAIRING

(1) Before repairing

When repair is requested from a customer, confirm whether the problem can be recovered by the methods described in "Measures for Problems" in the Instruction Manual in advance.

If possible, obtain information of how the problem occurred and write it down.

Before applying measures, operate the printer in the same condition as when the problem was generated and check if the problem still occurs. If the problem does not occur, start searching for the problem by performing test prints.

(2) Searching for what caused the problem

As for the method in searching for the cause of a problem, first confirm the alarm display in Table 8-1, check how the problem generated using Table 8-2, and confirm the specific contents of the problem. Next, search for the problem according to the detailed procedures.

Before repairing the problem, please acknowledge the precautions described in Section 5.1.

(3) Lamp display during a problem

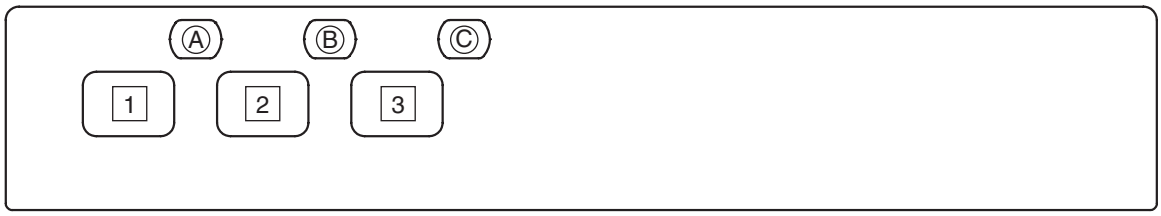
When a problem is generated in this printer, the content of the problem is notified by the lamps in the operation unit. The problem is notified by the blinking of Lamp Ⓑ and Lamp Ⓒ.

- Display content

Table 8-1

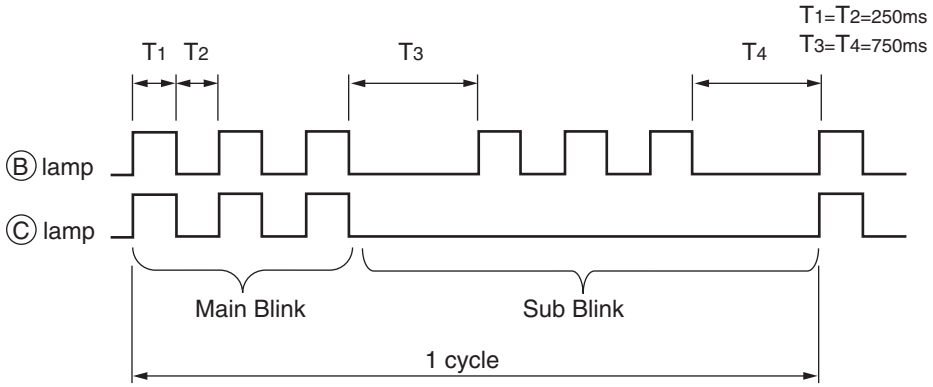
Main Blink	Sub Blink	Alarm Content	Remedy
1	1	Homing error	See section ⑥.
	2	Spacing error	
2	1	Program ROM error	Replace the control board.
	2	CG ROM error	
	5~7	Flash loading error	
3	3	Flash-ROM error	
4	1~9	CPU error	
5	1	F/W alarm	
9	1	Head thermistor error (Open status)	Replace the control board or print head.
	2	Space motor driver thermistor error	Replace the control board.
	3	Control board thermistor error	
	4	Head thermistor error (Short circuit status)	Replace the control board or print head.

Allocation of switch lamps



Main Blink: Ⓑ and Ⓒ lamps blinking simultaneously.
Sub Blink: Only Ⓑ lamp blinking.

The following describes Main Blink and Sub Blink. (Flash ROM error)



(4) Items to search

Table 8-2

Fault	Specific Content	Section to Refer
Power source abnormality	There is no response when turning on the power switch. (No lamps illuminate.)	①
Reset circuit abnormality	The carriage does not move at power ON and lamp some illuminates faintly.	②
Operator panel abnormality	Some lamps do not illuminate (although the carriage moves.)	③
	Some lamps illuminate and stay ON.	④
	Some switches do not function or functions continuously.	⑤
Carriage operation abnormality	The carriage does not move at power ON or an alarm generates while printing thus the print job is stopped and an alarm is indicated.	⑥
	The movement of the carriage is abnormal (runs out of control, vibrates, stops during homing, etc.) and an alarm is indicated.	⑦
Paper feed abnormality	Paper-end is generated even when paper is set. (Lamp Ⓒ goes on.) Paper-end does not generate even in paper-end condition. (Lamp Ⓒ goes off.)	⑧
	Line is not fed upon receiving/printing data.	⑨
Ink ribbon feed abnormality	Print result is faint. The ink ribbon is not fed properly or is not sent at all.	⑩
Print condition abnormality	Print dots are missing.	⑪
	Space movement is normal but print is not performed.	⑫
Interface abnormality	Upon receiving/printing data: Spacing or printing is not performed and Lamp Ⓑ is lluminating goes on.	⑬
	Upon receiving/printing data: Wrong characters are printed. Some characters are missing. Lamp Ⓑ is illuminating.	⑭

① There is no response when turning on the power switch. (No lamps illuminate.)

- Is the AC cord conduction normal?
  - N: Replace the AC cord.
  - Y: Is the AC fuse (F1) in the Pow Unit burned out?
    - Y: Replace the Pow Unit.
    - N: Is the LF Motor Cable disconnected from the LF MOT Connector on the control board, or is the SP Motor Cable disconnected from the SP MOT Connector on the control board?
      - Y: Connect the Motor Cable to the control board properly.
      - N: Is the LF Motor Cable broken?
        - Y: Replace the LF Motor.
        - N: Is the SP Motor Cable broken?
          - Y: Replace the SP Motor.
          - N: Is the voltage in the table bellow being out put to the connector (POW) for the Pow Unit?

Connector	Pin No.	Voltage
CN1	1, 3	+35V
	7, 9	+5V
	2, 4, 6, 8, 10	0V

- Y: Replace the control board.
- N: Replace the Pow Unit.

② The carriage does not move at power ON and lamp some illuminates faintly.

- Replace the control board.

③ Some lamps do not illuminate (although the carriage moves.)

- Replace the control board.

④ Some lamps illuminate and stay ON.

- Replace the control board.

⑤ Some switches do not function or functions continuously.

- Replace the control board.

⑥ The carriage does not move at power ON or an alarm generates while printing thus the print job is stopped and an alarm is indicated.

- Does the carriage move smoothly by hand when the power is turn OFF?
  - N: Does the carriage move smoothly with the ribbon cartridge removed?
    - N: Readjust the carriage unit.
    - Y: Replace the ribbon cartridge.
  - Y: Is +35V being output properly? (See Section ①)
    - N: Replace the Pow Unit.
    - Y: Is the fuse (F2) burned out?
      - Y: Replace the control board.
      - N: Is the SP motor cord connected properly?
        - N: Connect the cord properly.
        - Y: Turn OFF the power, remove the SP motor connection, and confirm that the resistance between pins 1-2 and 3-4 of the SP motor connector (SPMOT) is approximately 2.4Ω±10%.
          - N: Replace the space motor.
          - Y: Replace the control board.

⑦ The movement of the carriage is abnormal (runs out of control, vibrates, stops during homing, etc.) and an alarm is indicated.

- Is the SENSOR cord connected, and the attachment of a home position sensor properly?
  - N: Connect the cord or attachment the home position sensor properly.
  - Y: Is the output of HP-N (SENSOR1 connector - 9 pin) signals proper?
    - N: Replace the home position sensor.
    - Y: Does the carriage move smoothly when the power is turned OFF?
      - N: Does the carriage move smoothly with the ribbon cartridge removed?
        - N: Readjust the carriage unit.
        - Y: Replace the ribbon cartridge.
      - Y: Turn OFF the power and confirm that the resistance between pins 1-2 and 3-4 of SPMOT connection on the control board is approximately 2.4Ω±10%.
        - N: Replace the space motor.
        - Y: Replace the control board.

⑧ Paper-end is generated even when paper is set. (Lamp Ⓒ goes on.) Paper-end does not generate even in paper-end condition. (Lamp Ⓒ goes off.)

1) When using cut-sheets:

Set to menu mode and perform menu print.

If PE detect is set to OFF, reset to ON, and after confirming that paper-end is indicated, set to menu mode OFF.

Perform the following procedure if paper-end is not indicated.

- Does the sensor lever more smoothly by hand?
  - N: Readjust the sensor lever.
  - Y: Replace the control board.

⑨ Line is not fed upon receiving/printing data.

- Is the LF motor cord connected properly?
  - N: Connect the cord properly.
  - Y: Turn OFF the power, remove the LF motor connector, and confirm that the resistance between pins 1-2 and 3-4 of the LF motor connector (LFMOT) is approximately 7.3Ω±10%.
    - N: Replace the LF motor.
    - Y: Replace the control board.

⑩ Print result is faint.
The ink ribbon is not fed properly or is not sent at all.

- Is the ribbon being fed properly during a print job?
  - N: Remove the ribbon cartridge and check if the ribbon feed mechanism is operating properly.
    - N: Replace the ribbon feed gear assembly.
    - Y: Replace the ribbon cartridge.
  - Y: Has the ink ribbon reached its life?
    - Y: Replace the ribbon cartridge.
    - N: Is the head gap set at the regulated value?
      - N: Readjust the head gap.
      - Y: Replace the print head.

⑪ Print dots are missing.

- Is the head gap set at the regulated value?
  - N: Readjust the head gap properly.
  - Y: Are dots still missing after replacing the print head?
    - N: End the procedure.
    - Y: Are dots still missing after replacing the space motor assembly?
      - N: End the procedure.
      - Y: Are the sections between the control board HD1, HD2 ↔ head cable ↔ carriage ↔ print head connected properly?
        - N: Reinstall properly.
        - Y: Replace the control board.

⑫ Space movement is normal but print is not performed.

- Is print disabled even after replacing the print head?
  - N: End the procedure.
  - Y: Are the sections between the control board HD1, HD2 ↔ head cable ↔ carriage ↔ print head connected properly?
    - N: Reinstall properly.
    - Y: Replace the control board.

⑬ Upon receiving/printing data:
Spacing or printing is not performed and Lamp Ⓑ is lluminating goes on.

- Is the interface cable connected properly?
  - N: Connect the cable propenly.
  - Y: Replace the control board.

⑭ Upon receiving/printing data:
Wrong characters are printed. Some characters are missing. Lamp Ⓑ is illuminating.

- Is the interface cable connected properly?
  - N: Connect the cable propenly.
  - Y: Replace the control board.

9. PERIODICALLY REPLACED PARTS

The following parts shall be replaced in the designated period.

Table 9-1 Periodically Replaced Parts

No.	Name	Part No.	Replacement cycle [time (H) is POWER ON TIME]
1	Print head	43441603	200million dots/pin
2	Ribbon protector	43719201	Estimated 2000H (actual operation)

10 OPERATION

10.1 Summary

The main configuration of this printer is the print mechanism unit and print control unit.
The print mechanism unit can be divided broadly into the print head, space system, paper-feed system, and ribbon-feed system. The operation of each item is listed below.

(1) Print head .....Prints with the 24 wire-dot magnet. The dot patterns are configured in the print control unit.

(2) Space system .....The stepping motor moves the carriage and performs spacing, tab, and carriage return.

(3) Paper-feed system.....Paper is fed by the stepping motor.

(4) Ribbon-feed system .....Ribbon is fed by obtaining drive force from the stepping motor just as in the space system.

(5) Print control unit.....Controls the interface and mechanism with SoC.

10.2 Circuit Operation (See Fig. 10-1)

The circuit of this printer consists of the control board and carriage board.
Circuits such as SoC and its peripheral circuits, drive circuits, and the external interface circuit are set on the control board.
The switches and LED are set on the control board.
With the control board being the main board, the boards are connected by cables.

10.2.1 SoC and peripheral circuits

(1) SoC

SoC to be CPU and past LSI function, building SRAM into, and the outline is as follows.

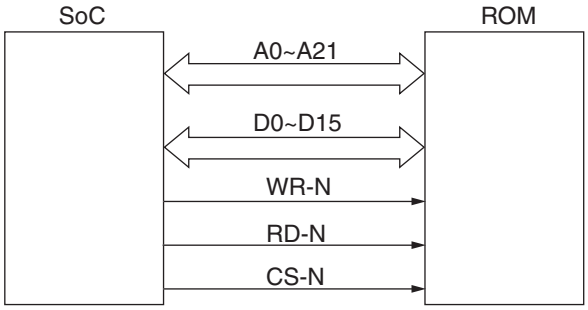
- 3.3V single power supply (1.2V in internal core voltage)
- Operation frequency 48MHz
- Built in CPU core (ARM7TDMI)
- SRAM 4Mbit
- With built-in USB controller
- With built-in UART function
- AD converter x 4ch, DA converter x 2ch

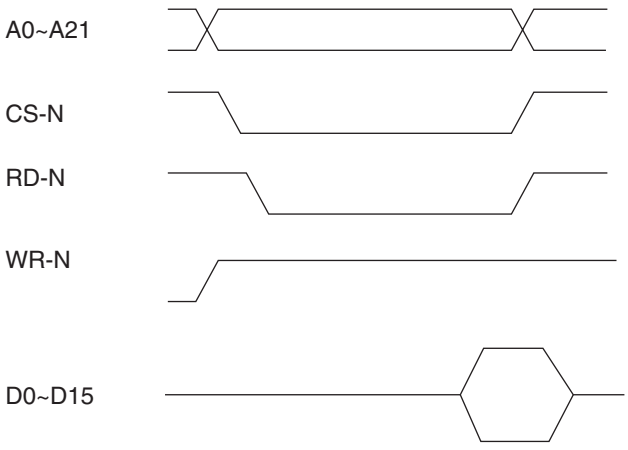
Other peripheral circuitry is OKI original.

(2) Program ROM (external FLASH ROM)

The program to make the printer work is stored in FLASH ROM as external ROM.

FLASH ROM that can be installed is 64Mbit (16 x 4096k) or less. The access timing of the outline to FLASH ROM is shown in the following.





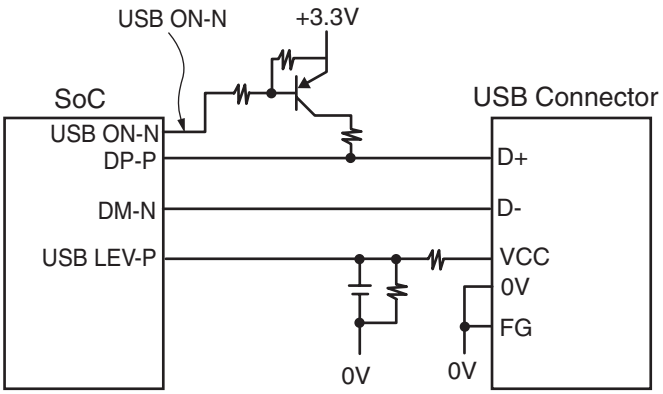
(3) RAM

In RAM, the memory capacity built into SoC is 256K x 16bit (4Mbit).

(4) USB Controller

The USB Controller detects and controls the USB interface.

The USB Controller is built into SoC. The figure below shows the outline circuit.



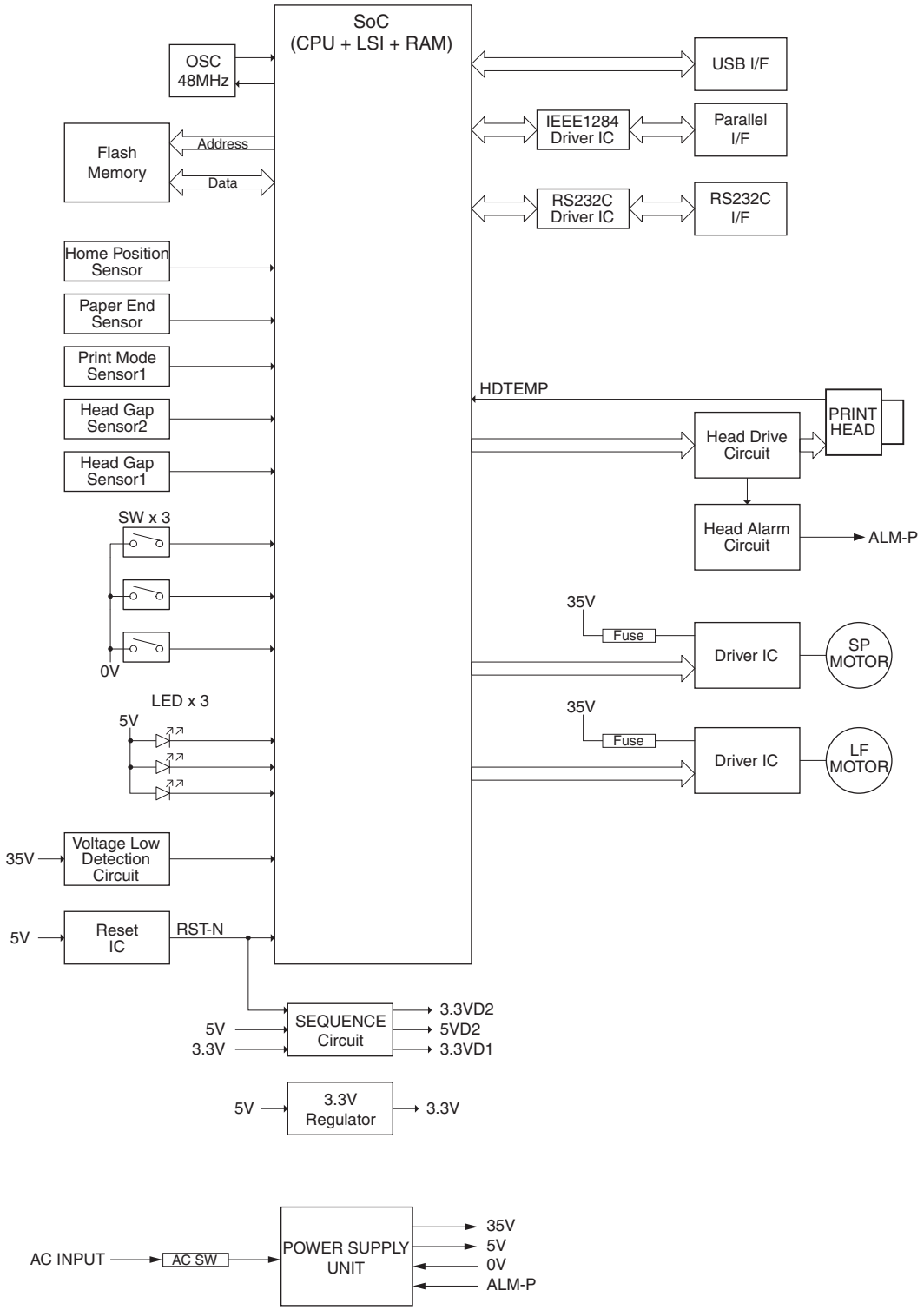
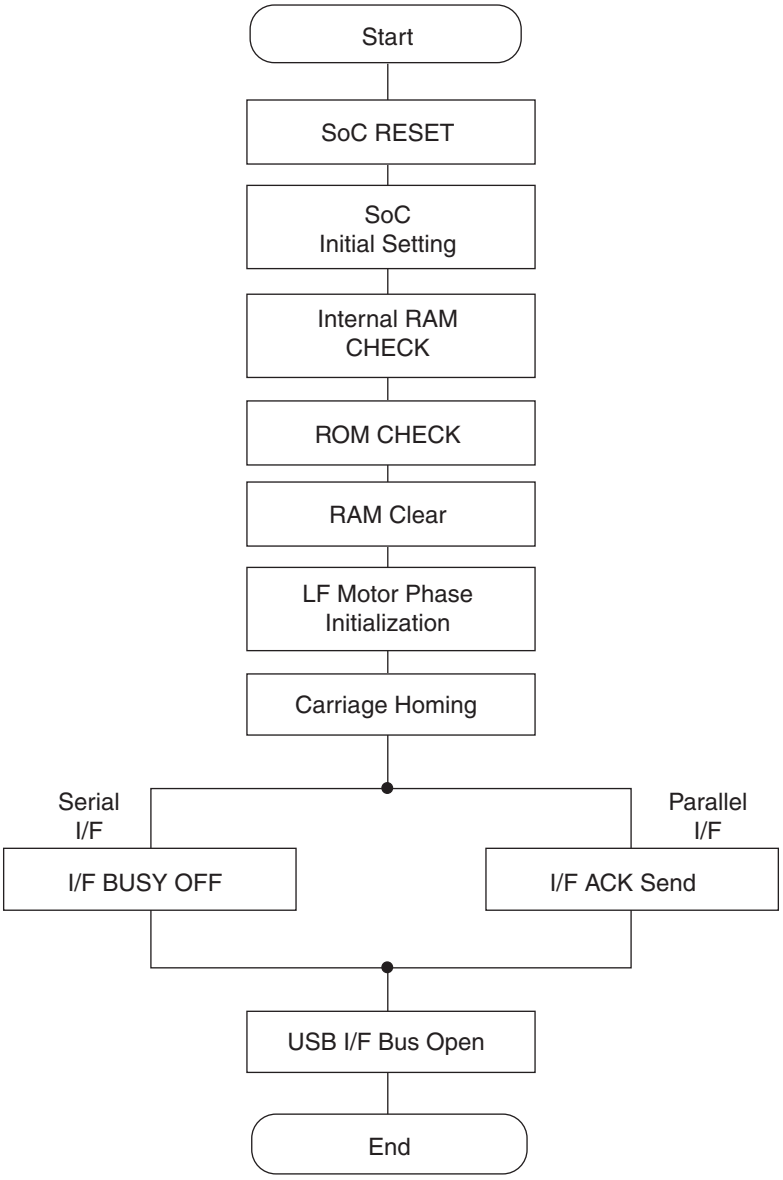

SoC
(CPU + LSI + RAM)
OSC
48MHz
Flash
Memory
Address
Data
USB I/F
IEEE1284
Driver IC
Parallel
I/F
RS232C
Driver IC
RS232C
I/F
Home Position
Sensor
Paper End
Sensor
Print Mode
Sensor1
Head Gap
Sensor2
Head Gap
Sensor1
HDTEMP
PRINT
HEAD
Head Drive
Circuit
Head Alarm
Circuit
ALM-P
SW x 3
0V
35V
Fuse
Driver IC
SP
MOTOR
LED x 3
5V
35V
Fuse
Driver IC
LF
MOTOR
35V
Voltage Low
Detection
Circuit
5V
Reset
IC
RST-N
5V
3.3V
SEQUENCE
Circuit
3.3VD2
5VD2
3.3VD1
5V
3.3V
Regulator
3.3V
AC INPUT
AC SW
POWER SUPPLY
UNIT
35V
5V
0V
ALM-P

Fig. 10-1

10.2.2 Initializing operation

This printer is initialized when the power is turned on or when the I-PRIME-N signal is input from the host side via the parallel interface.
For the initialize operation, the RST-N signal is first output from the reset circuit to reset the SoC and Flash ROM. When resetting ends, the program starts. Reset operation by I-PRIME starts program to initialize, but does not reset the SoC.
The program here sets the mode of the SoC, checks the memories (ROMs and RAMs), then carries out carriage homing, and determines the LF motor phase.
Finally, the program establishes the interface signals (P-I/F: ACK-P signal sending, and S-I/F: BUSY-N signal off) and lights the SELECT lamp to inform the ready state for receiving to the host side and ends the initialize operation.
After USB I/F control I/O initialization and USB I/F bus opening.



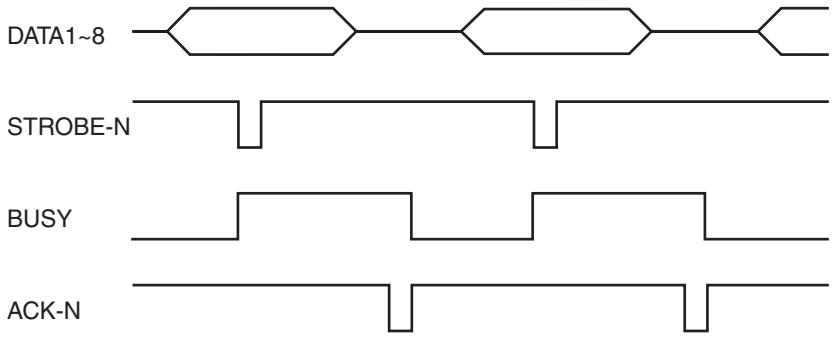
10.2.3 Controlling the interface

1) Parallel interface

Data from the interface is input from the connector (CENT) and is read in the timing of the STROBE-N signal by the interface, print head, and SoC for motor control.

When this signal is being process, the BUSY signal goes ON. When the process is completed, the BUSY signal goes OFF, sends an ACK-N signal, and waits to receive the next data.

(E.g.) When [I/F timing] is set to [A-B] in an English menu.



2) Universal Serial Bus (USB)

Universal Serial Bus Specification Revision 2.0 (Full speed) compliance.

1) Connector

- Printer Side : "B" Receptacle (Upstream Input to the USB Device)
- Cable Side : Series "B" Plug

2) Cable

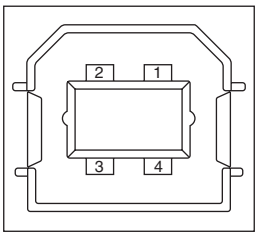
- Cable Length : Approx 1.8m (A cable must be met USB Spec Rev 1.1 for normal operation)

Note: Cable is not supplied.

3) Table of USB I / F signals

Contact Number	Signal Name	Typical Wiring Assignment
1	Vbus	Red
2	D -	White
3	D +	Green
4	GND	Black
Shell	Shield	Drain Wire

4) Connector pin arrangement



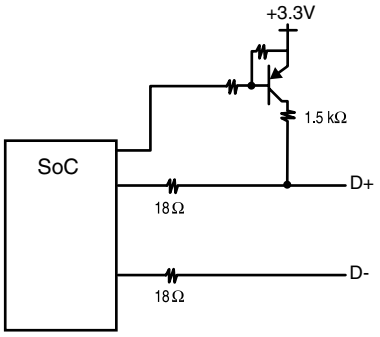
5) Mode & Class of Device

- Full - speed Driver
- Self - powered Device

6) Data Signaling Rate

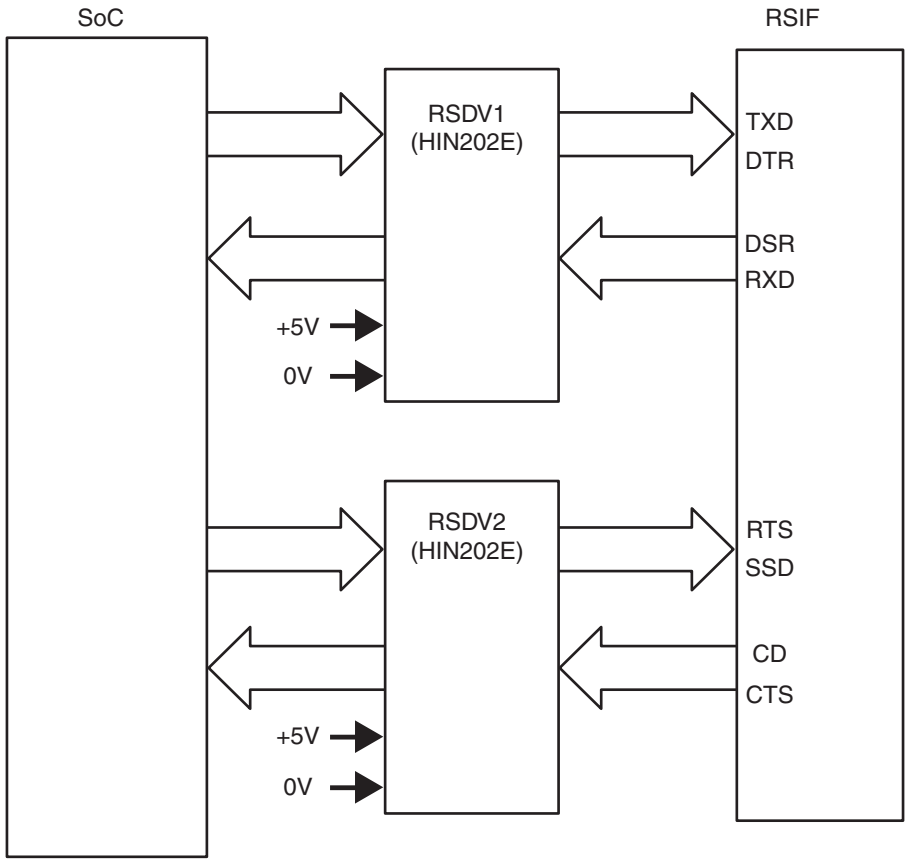
- Full - speed function - 12Mb/s ± 0.25%(2500ppm)

7) Interface circuit



3) RS232-C Serial Interface (ML5500FS Only)

This serial interface is capable of transmitting and receiving simultaneously at speeds up to 19,200 bits per second. Two protocols are available: printer Ready/Busy and X-ON/X-OFF modes.

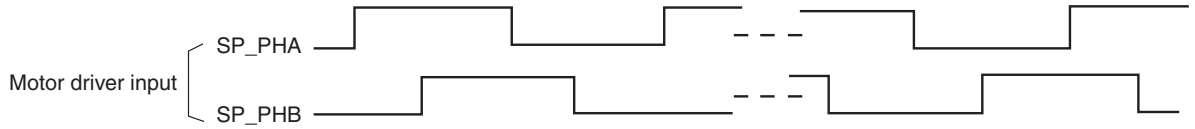


10.2.4 Print head control drive circuit

This circuit produces the print timing and drive time from SoC, drives the head magnet that corresponds to HEAD 1~24 with HD01-24-P signal and HDCOM1~4 - P signal and prints.
As the print head is dispersed and allocated in each group, the four groups are controlled individually.

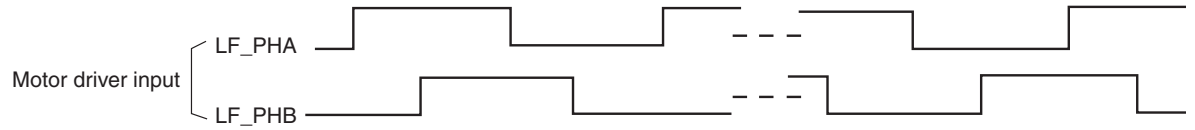
10.2.5 Spacing

SoC outputs space motor phase signals (SP_PHA, SP_PHB). It outputs IPT signals as the dot timing and carriage position detection timing in sync with these phase signals.
The space motor phase signals (SP_PHA, SP_PHB) are input to the motor driver, which drives the space motor.



10.2.6 Line feed

The LF motor phase signals (LF_PHA, LF_PHB) from SoC are input to the motor driver, which drives the LF motor.



10.2.7 Alarm circuit

(1) High-temperature head alarm

The temperature of the head is monitored by a thermistor embedded in the head to protect the head coil.

The head temperature will rise after continuous heavy-duty print jobs. Therefore, when the head rises beyond a specified temperature, a thermal alarm mode will be entered, and after the current line is printed, the speed for printing the following lines will be decreased. Furthermore, if the head temperature does not fall, the following lines will be divided into two depending on the temperature, and printed by single-direction print.

The alarm is detected when the resistance of the thermistor decreases from the rise in the head temperature and SoC is input in the A/D converter.

10.2.8 Paper-end detect circuit

When paper runs out, the photosensor (PE) goes Hight level.
This signal is input in SoC which goes on the Lamp Ⓒ.

10.2.9 Power source unit

The power source unit supplies DC+35V, and +5V to each section by switching power.

10.3 Mechanism and Operation

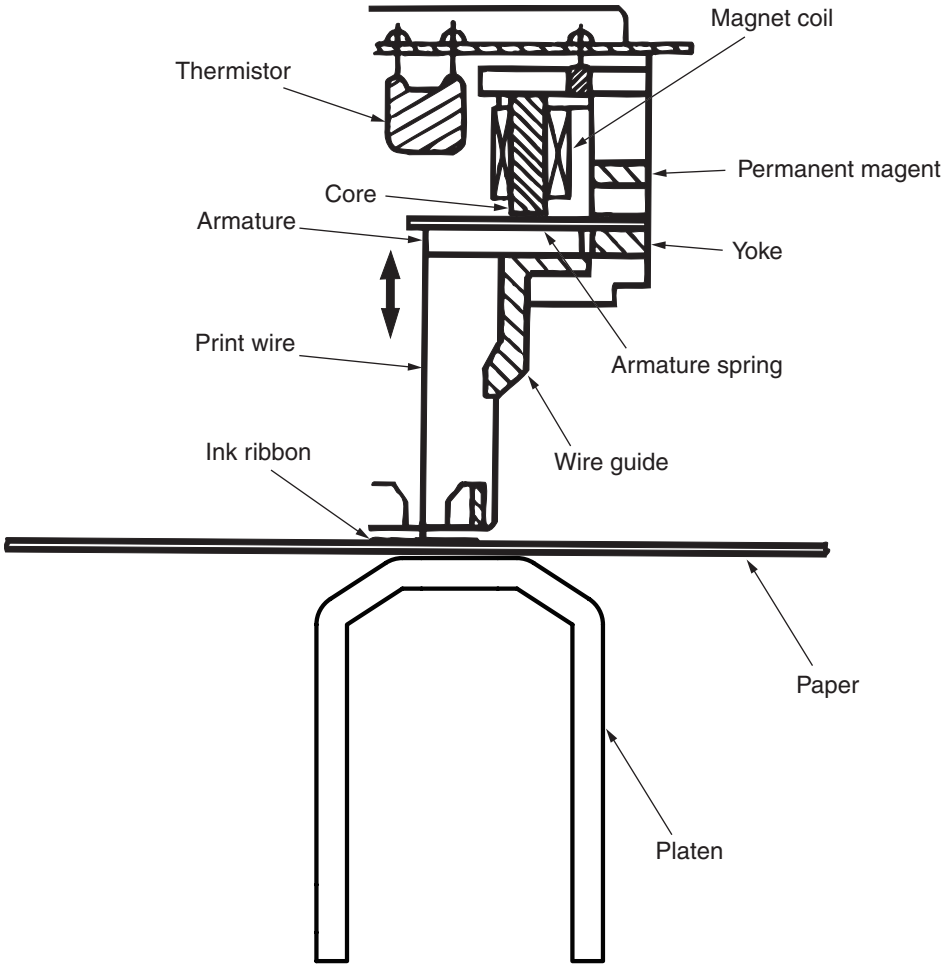
10.3.1 Mechanism and operation of the print heat

The print head is a spring charge type head using a permanent magnet and is installed on a carriage that moves in parallel with the platen.

(1) Operation of the print head

An armature is normally absorbed to the core by warping an armature spring with a permanent magnet. The status of the print wire, which is integrated with the armature, will also be reset at this time.

When the magnet coil is energized by the print command from the device control unit, a magnetic flux opposite to that of the permanent magnet is generated. Then, the armature moves in the opposite direction of the core from the force of the armature spring and the print wire collides with the platen. Paper and ink ribbon are set between the the platen and print wire, and due to this collision, the ink on the ink ribbon is transferred on to the paper.

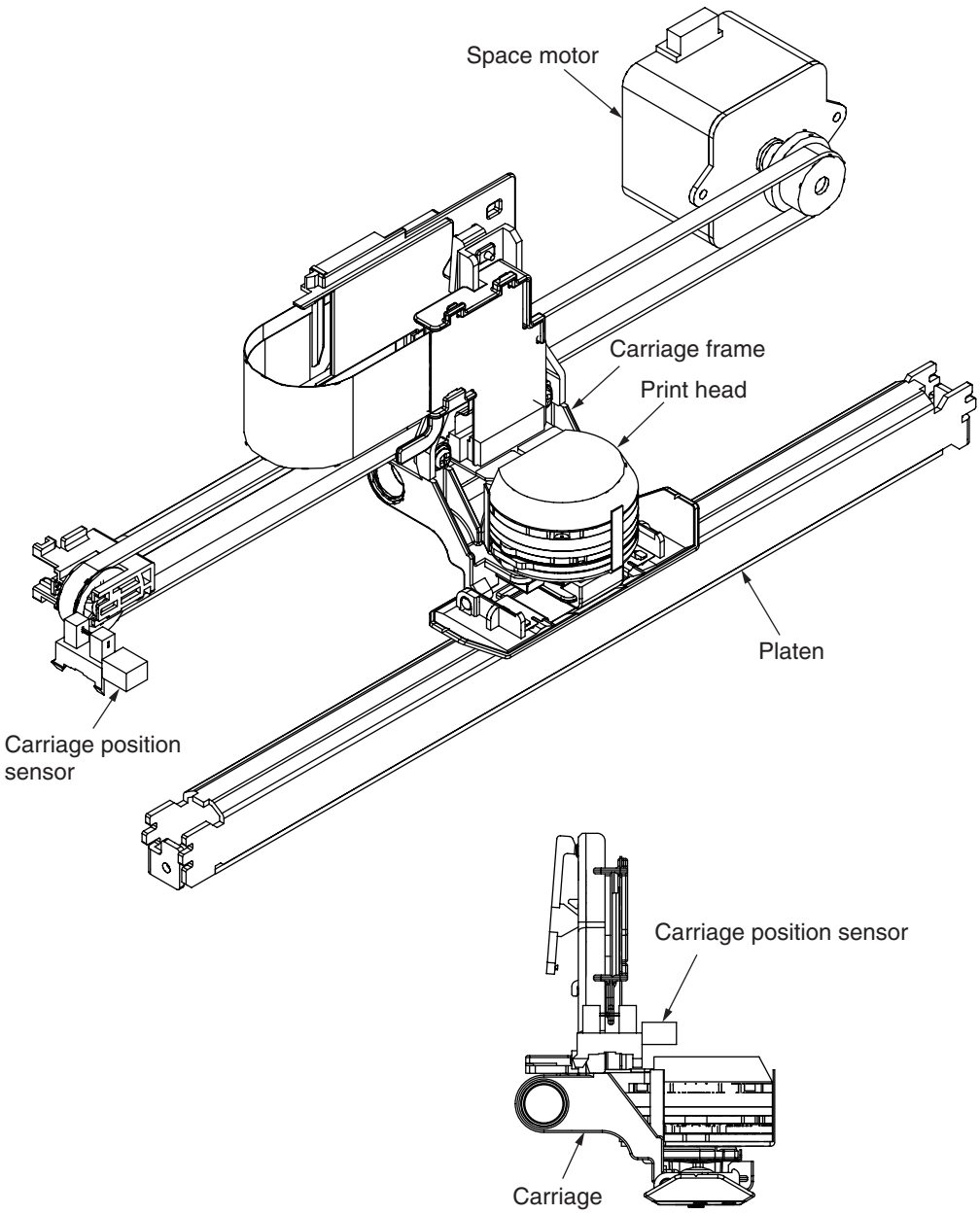


10.3.2 Mechanism and operation of space

The space mechanism of printers consists of several parts, including a carriage shaft placed parallel to a platen and a carriage frame that moves along the carriage shaft. The space mechanism is driven by a space motor located behind the carriage frame.

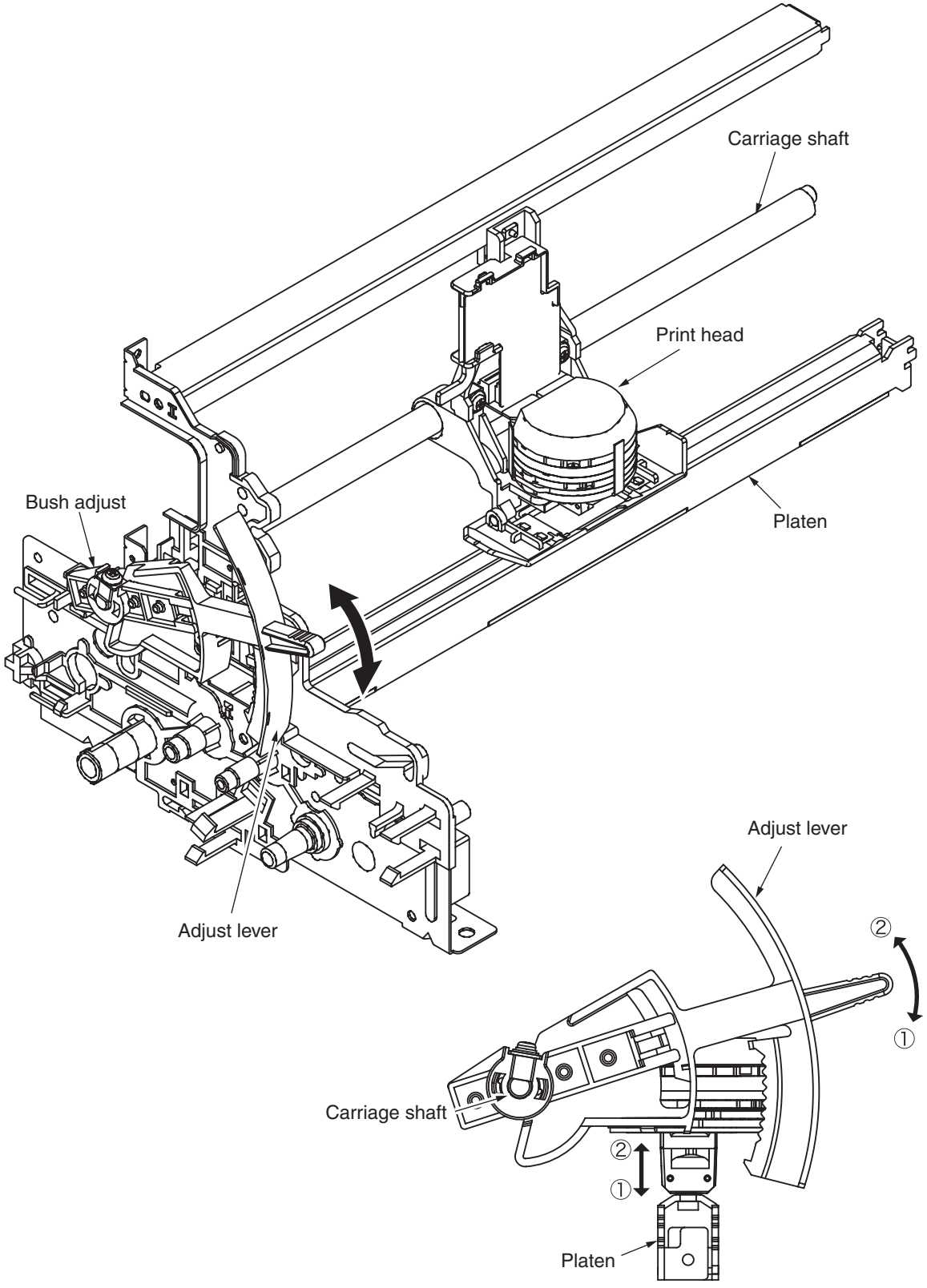
(1) Spacing operation

A carriage carrying a print head moves on its shaft parallel to a platen. As a space motor revolves, the power of the space motor is transferred to a mini pitch belt. This completely moves the carriage. The position of the frame of the carriage is identified by the numbers of pulses from right and left carriage position sensors.



10.3.3 Mechanism for adjusting the head gap

The head gap adjustment is a mechanism to correct the gap between the print head and platen by moving the adjust lever vertically and rotating and moving the carriage shaft up and down.
The movement of the adjust lever rotates the carriage shaft that is connected directly to the adjust lever.
The carriage shaft is decentered against the fulcrum of the adjust lever (section fit with the carriage shaft), therefore, the carriage shaft moves up and down when the adjust lever rotates. The print head then moves to-and-fro the platen.



10.3.4 Mechanism and operation of ribbon feed

Ribbon feed is a mechanism to feed the ribbon which is driven by the stepping motor.

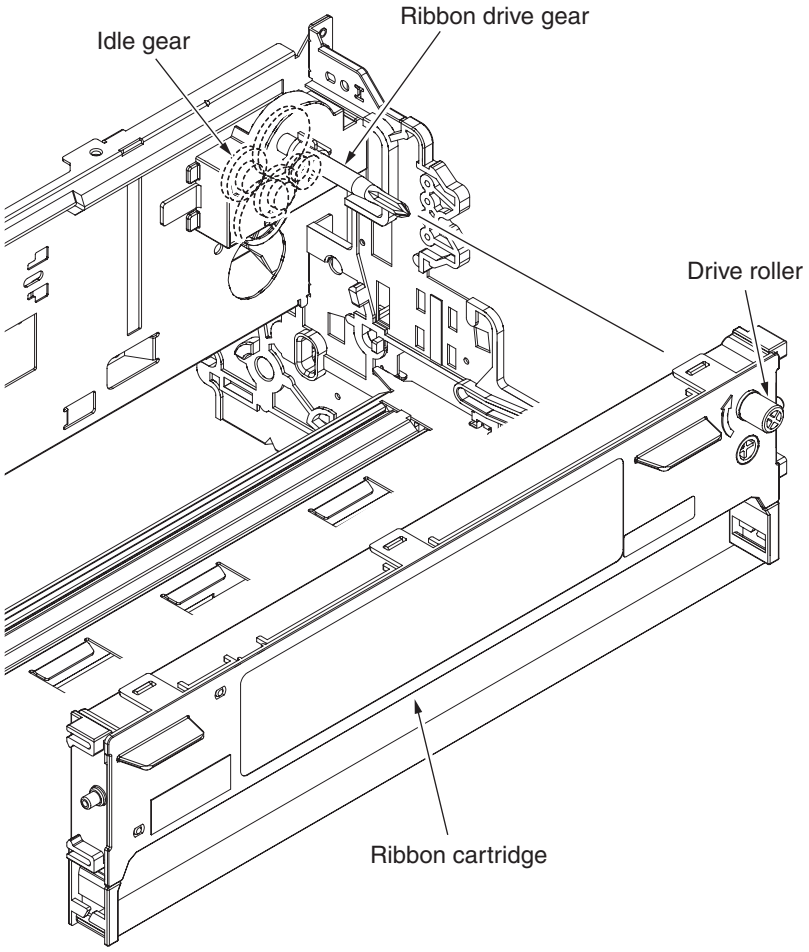
(1) Ribbon cartridge

The use of a one-way feed endless ribbon provides clear print results.

(2) Feed operation

Ribbon feed is initiated at the same time the spacing operation is initiated regardless of the mode, and stops when the spacing operation is ceased.

The rotation of a driven stepping motor is transferred to the drive roller in the ribbon cartridge via the ribbon gear which feeds the ink ribbon.



10.3.5 Mechanism and operation of paper feed

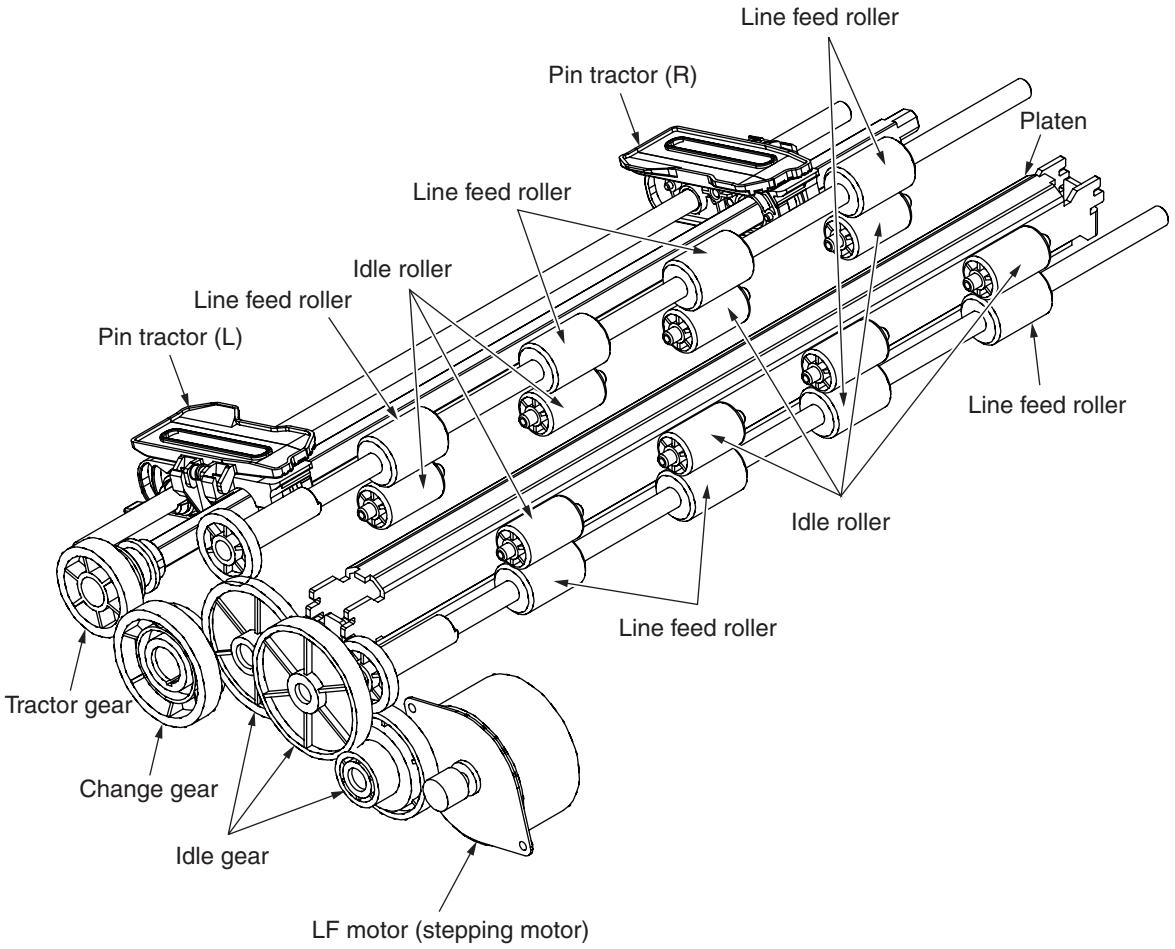
The line feed operation is driven by the LF motor that feeds the line feed roller and pin tractor.

(1) Paper feed operation

The LF motor (stepping motor) for feeding paper is installed on the left frame and the rotation of the motor is transferred to the platen gear via the deceleration gear.

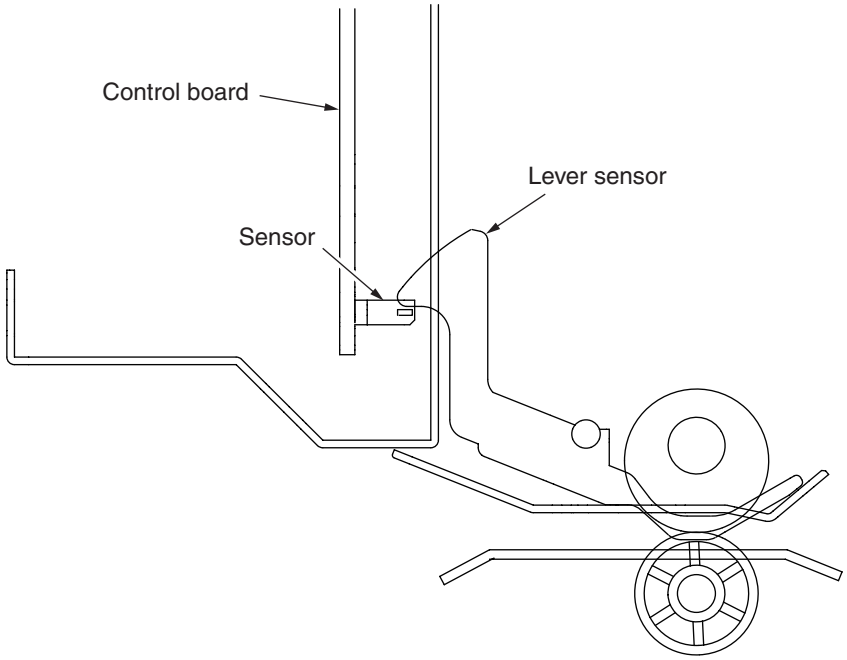
The rotation of the line feed roller is also transferred to the pin tractor by switching the change gear.

It is mechanically designed so that paper is fed by 0.139 inch (3.5mm) when the LF motor rotates 48 steps (360 degrees).

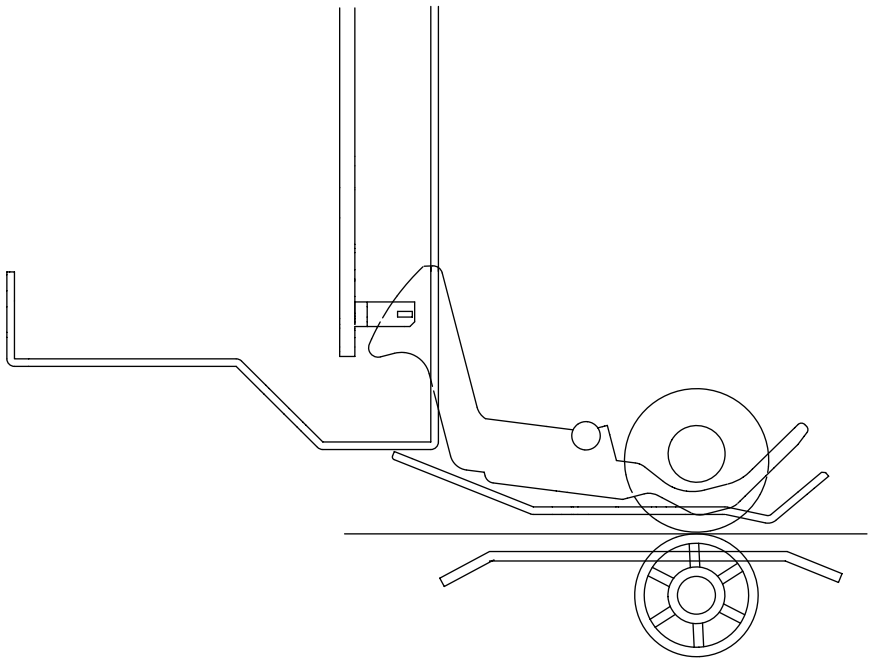


10.3.6 Mechanism for detecting the paper-end

When paper is inserted, the paper blocks the leading end of lever sensor from entering the groove on the upper sheet guide, thus, the status of the paper-end sensor is ON. However, when paper is present, lever sensor enters the groove of the upper sheet guide and the sensor is cut off by rear portion of lever sensor. With this operation, the status of the paper-end sensor becomes OFF and paper-end is detected. Paper-end is detected at approximately 22mm of the remaining paper length from the print position. When using cut-sheet, however, paper-end may not be detected upon operational control even when the paper-end sensor is OFF. (The following figures describes the front paper-end sensor.)



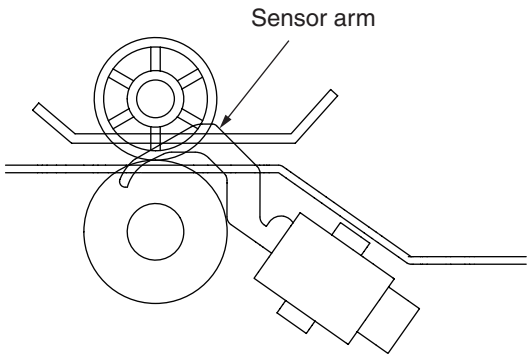
Without Paper



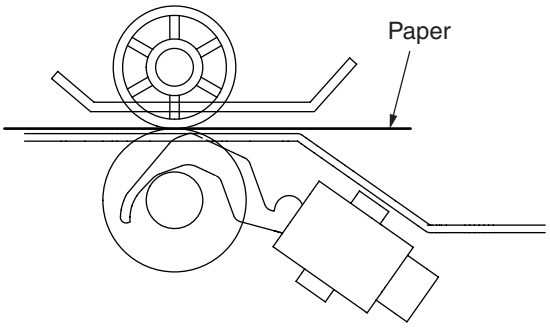
With Paper

10.3.7 Mechanism for detecting the table sensor

When paper is inserted in the stage, the paper blocks the leading end of table sensor from entering the groove on the upper sheet guide, thus, the status of the stage sensor is ON. However, when paper is present, table sensor enters the groove of the upper sheet guide and the sensor is cut off by rear portion of table sensor. With this operation, the status of the stage sensor becomes OFF.



With Paper



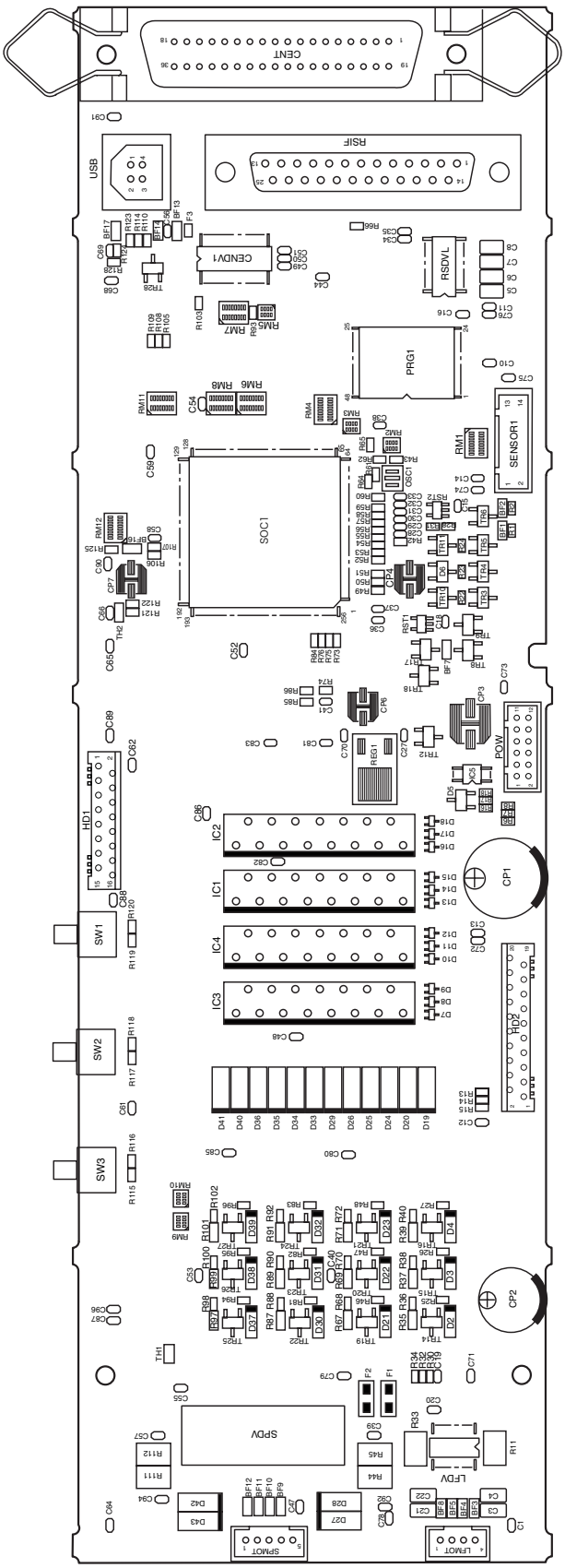
Without Paper

APPENDIX A PCB LAYOUT

-PCB List-

(1) Circuit board, LFC (Main Controller)

ML5100FB


CENT
RSIF
USB
CENDV1
RSDVL
PRG1
SOC1
SENSOR1
POW
IC1
IC2
IC3
IC4
SW1
SW2
SW3
CP1
CP2
SPDV
LFDV
SPMOT
LFMOT